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ARCHIVES
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EDITED IN ENGLISH AND GERMAN

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of St. Petersburg; and many others.

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ARCHIVES OF OTOLOGY.

A TRAGUS RETRACTOR.

By E. CRESSWELL BABER, M.B.

SURGEON TO THE BRIGHTON AND SUSSEX THROAT AND EAR HOSPITAL.

(With three wood-cuts.)

IN performing manipulations in the cartilaginous meatus, I have often experienced the want of an instrument to give a good view of the outermost part of that canal without the insertion of an aural speculum.

On drawing up the auricle in order to straighten the meatus the tragus is usually pulled backwards, at the same time covering to a greater or less extent the orifice of the canal. The tragus can of course be drawn forwards by an assistant or by pushing forward, with a finger, the skin in front of the ear, but this can be more conveniently accomplished by means of the following simple instrument.

The retractor¹ (Fig. 1) consists of a ring of flat metal about $1\frac{1}{2}$ centimetres wide, made to fit firmly on the last phalanx of the surgeon's left forefinger, the ring, however, being left incomplete so that its size can be varied according



FIG. 1.

to circumstances. The end of the flat band of metal forming the ring is bent back obliquely at an angle of about 45 degrees, making a blunt hook about 12 millimetres in length. The same instrument does for both ears.

¹ Made by Messrs. Down Brothers, Borough, London and Messrs. Tiemann & Co., New York.

It is conveniently made of aluminium.

The following is the method of employment :

In examining the right ear (Fig. 2) the retractor is fixed

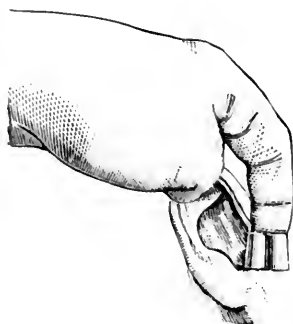


FIG. 2.

Mode of applying tragus retractor to right ear.

on to the left *index finger* in such a way that the hook points towards its dorsal surface, and whilst the auricle is drawn upwards and backwards with the left middle finger and thumb the tragus is held aside by a forward movement of the forefinger carrying the instrument.

To apply the retractor to the left ear (Fig. 3) it is fixed



FIG. 3.

Mode of applying tragus retractor to left ear

on the left *ring finger* with the hook pointing to its palmar surface, or rather towards the little finger. The auricle is then pulled upwards and backwards with the thumb and first two fingers of the same hand, whilst by pressing the ring finger downwards the tragus is easily retracted.

The instrument ¹ thus used gives a good view of the orifice of the meatus. Needless to say that the extent to which the canal can be inspected depends not only on the size of its lumen, but also on the amount of curvature it possesses, and especially on the number of hairs present in it. A considerable extent of the membrana tympani itself is at times visible.

A few circumstances under which this retractor is useful are, the instrumental removal of cerumen, scales, etc., from the outer part of the canal, the incision of boils in the meatus, the snaring off of large polypi filling the cartilaginous meatus, etc.

¹ A somewhat similar instrument attached to the left thumb may be employed for retracting the left tragus whilst the auricle is held up between the first and second fingers, but as it presents no special advantages the one just described, which does for either ear, is preferable.

A CASE OF "SARCOMATOUS" GROWTH IN THE EXTERNAL AUDITORY CANAL.

By A. MARMADUKE SHEILD, M.B. (CANTAB.), F.R.C.S.
(ENGLAND).

SENIOR ASSISTANT SURGEON AND AURAL SURGEON TO CHARING CROSS HOSPITAL, LONDON.

A young married lady consulted me on March 6, 1891, by the recommendation of Mr. Barton of Blackheath. She told me that she had suffered since childhood from left otorrhœa, and that all her life the left ear had occasionally given severe trouble from its painfulness and discharge. When about ten years old "the back of the ear was lanced," to give exit to matter. In December, 1890, being then resident in the Mauritius, she had severe pain and an "abscess burst" at the back of the ear. At this time she was under the care of Dr. Chazal of Mauritius. His full account of the case may thus be summarized: Severe pain in the ear. The incision of an abscess over the mastoid. Clearing of the canal, and evacuation of debris of discharge and epithelium, with the subsequent development of a swelling of a dubious nature, towards the posterior wall of the canal.

On examination the patient was pale and anæmic, and complained of pain and giddiness, with disagreeable cerebral sensations on the left side. A profuse watery discharge, fetid and often blood-stained, perpetually flowed from the meatus. Behind the auricle is a closed sinus. There is no tenderness over the mastoid. The throat is normal. The left nasal passage is somewhat narrowed, by a deviated septum.

On introducing a large speculum, a formidable-looking growth, of the size and shape of a large cherry, at once came into view. It completely filled the canal, and was of a pale gelatinous aspect, resembling a mucous polypus of the nose. The tumor was sessile, firm to examination by the probe, not very sensitive, and appa-

rently growing from the posterior wall of the bony canal. Complete deafness to conversation was present, and the watch and tuning-fork were heard on contact only. The canal was cleansed and purified by soaking in mercurial lotion for two days, and on March 10th the first operation was performed, Dr. F. Hewitt administering ether.

The method of removal was by snare and forceps, portions of the tumor being thus taken away, and the remainder well broken up. In consistence the growth was unusually firm, and the operation was tedious, owing to the free oozing obscuring the parts. Finally pure chromic acid was freely applied to the remains of the growth, and its ultimate destruction seemed to be complete. No severe symptoms followed the operation.

March 13th.—Chromic acid again freely applied under cocaine. There is less discharge, and not much pain.

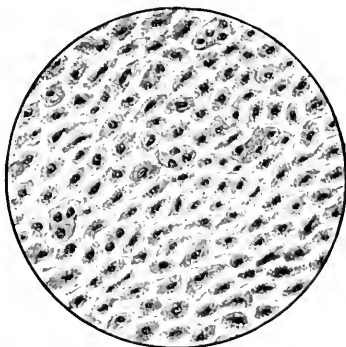
March 19th.—Patient returned home, being instructed to syringe the ear frequently with warm and dilute carbolized lotion. Much debris of the growth has come away. The patient has, already, experienced relief from its removal.

April 6th.—There can be no question that the growth is returning, a nodule the size of a large pea can be seen apparently growing from the upper and posterior wall of the canal. This is more vascular and florid than its predecessor. The discharge has much diminished. There is a large perforation in the upper part of the tympanic membrane.

At this time I obtained a report of the microscopical examination of the tumor by Dr. Sheridan Délepine, pathologist to St. George's Hospital. "The surface of the tumor," he writes, "is almost entirely denuded of epithelium; the ground-substance, especially near the hilum, is composed of embryonic tissue, with spindle-shaped, round, or irregular cells, some having many nuclei, and having the character of myeloid cells. In the midst of that tissue, numerous channels, evidently vascular and lymphatic, branch in all directions. These are lined with flattened cells. . . . The tumor is a sarcoma."

I here append a drawing, made by myself, of the microscopical character of the cells. The section was stained in logwood.

The rapid recurrence of the growth after a very careful removal, and the result of the microscopical examination, made me very anxious to again attack it without delay. Seeing that it originated in the bony canal, the idea occurred to me that a more complete operation might be executed, by detaching the auricle, and chiselling away the posterior wall of the canal. Before having recourse to



a second operation, however, I requested the patient to obtain another opinion, and I met Dr. Urban Pritchard in consultation.

We agreed as to the rarity of sarcomatous polypus of the ear, but on examining the section prepared by Dr. Délepine, we could not but share his belief that the tumor was of this nature. After fully discussing all the possible methods of treatment, it was decided that I should make another attempt to remove the tumor *per vias naturales*.

The second operation was performed under ether, on April 7th. The parts being well illuminated, I attacked the growth and its bony site, with a small, sharp, and strongly curved curette, especially made for the case. I persistently scooped the bone from which the growth originated, until I had worked a small shallow cavity therein. The operation was constantly interrupted by free oozing of blood, which was checked by syringing with hot water and alcohol.

On examining the bone with a curved probe, this instrument, to my surprise, passed through a sinus inwards and backwards

towards the mastoid cells. On withdrawal of the probe pus followed its track, and it was evident that the growth had located itself round a sinus, similar in nature to the healed sinus observed behind the auricle. I next applied the fine point of a curved galvano-cautery, repeatedly searing over the cavity in the bone with perseverance and pressure, so as to destroy the surface thoroughly. Some pain, but no symptoms of dangerous import, followed the operation. Warm syringing with dilute carbolic lotion was employed.

On the third day after the operation I passed a fine curved tube into the sinus and injected several drachms of a ten-volume solution of peroxide of hydrogen into the mastoid cells. The fluid, mixed with discharge, passed freely into the naso-pharynx by way of the tympanum and Eustachian tube (?), and the sensations experienced were exceedingly disagreeable. Nevertheless I persisted, using the injection daily for a week, and afterwards once a week only. The patient used the same application to fill the meatus and "soak" the tympanum.

She was always conscious of a "seething" noise in the mastoid at the time of injection, this being doubtless due to the action of the gas upon pus.

September 7th.—All through the summer, the ear has been daily syringed out with a warm and dilute solution of sulpho-carbolate of zinc. The general health is greatly improved, and the discharge from the ear hardly noticeable.

October 4th.—The site of the operation is marked by a firm cicatrix, and the sinus seems to have closed. There is no sign of return of the growth, which seems quite eliminated. Remains of the membrana tympani are visible below, and a large perforation superiorly shows the inner wall of the cavity. The ossicles have disappeared. There is no sense of hearing, except on contact.

The improvement in the general condition of this patient was very striking, and one may well hope that, as upwards of six months have passed without return of the growth, the latter is eradicated.

There can be no doubt that true sarcomatous polypus of the ear is rare; the recurrence after removal, so often noted, being rather due to persistence of conditions which excite growth of embryonic granulation tissue, than any inherent malignant constitution of that growth itself. In the

present instance the microscopical characters of the tumor are certainly those of a myeloid growth. Its peculiar gelatinous aspect, and rapid recurrence after removal, are in favor of this view. The evident association of this growth with a suppurating sinus, is a clinical point which may be urged against this opinion. Malignant disease of bone, with the exception of epithelioma of the jaws, is very rarely associated with suppuration. On the discovery of a sinus, I felt encouraged in giving a more favorable prognosis than had hitherto been justifiable. I am strongly in favor of giving to the microscope a subordinate position in respect to accurately observed clinical facts. Rapidly growing embryonic tissue, such as the "fungoid" granulations about necrosed bone, presents cellular types and configurations so like sarcoma as to render a differentiation by the microscope very problematical. I need hardly say, that this is a very important consideration for those who would operate upon microscopical evidence alone.

The treatment of this growth, in the second instance, was suggested to my mind by the recollection of similar proceedings in cases of sarcoma of the orbit, antrum, and tibia. I have several times seen undoubted sarcomatous tumors removed from these localities by scooping them out and applying Pacquelin's cautery. The results have been, in several instances, immunity from recurrence for many years. The operation performed in the present case was a miniature but faithful representation of this proceeding. The result is very satisfactory, and promises to be a definite cure. Should this anticipation be falsified, sufficient relief and immunity, have been experienced, to point to the efficacy of the operation.

A HANDY FORM OF INTRA-TYMPANIC SYRINGE.

By URBAN PRITCHARD.

(*With one wood-cut.*)

IT is very often asserted that when there is a perforation in the membrana flaccida the accompanying otorrhœa is practically incurable. And it must be confessed that grounds exist for this unfavorable prognosis. In the first place, the perforation itself is usually a very small one, and consequently very liable to become blocked with inspissated pus, etc. Secondly, the situation of the membrana flaccida, at the extreme upper part of the *Mt*, is such as to render the process of cleansing one of great difficulty and delicacy, and, for the same reason, the introduction of appropriate instillations is by no means easy. Finally, the communications which exist between the attic and the mastoid antrum, and, usually in the adult, with the mastoid cells, while rendering thorough and systematic cleansing even more desirable in these cases, yet further increase the difficulties.

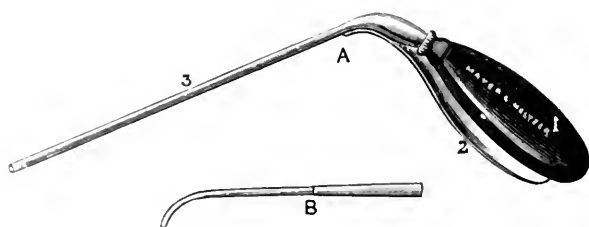
To overcome these obstacles it is now usual to employ a special form of syringe (intra-tympanic). Of these several patterns have been suggested. Thus, for instance, Dr. Hartmann uses a small ball syringe with a long, fine, metal tube bent at the tip; Dr. Delstanche has adapted his well-known little force pump to a fine metal tube; and other shapes have been proposed.

The syringe which I am now using myself (see Fig.) may be looked upon as a modification of Dr. Hartmann's, but it has what I venture to think are the following advantages, viz. :

1. The rubber reservoir (1), instead of being in a direct line with the metal tube (3), is fixed at an obtuse angle, and at the same time is made oval in shape; the instrument does not therefore interfere with the due illumination of the meatus.

2. Beneath the reservoir, and of the same size, a spoon-shaped metal plate (2) is attached to the metal tube; this serves as a *point d'appui* in applying pressure with the thumb to the reservoir, which can thus be easily manipulated with one hand.

3. The fine metal tube is straight, but if, as is so frequently the case, we wish to direct the stream of fluid at an angle, a small second tube (B) is provided, curved at the tip, and fixing on to the straight tube by a simple plug-joint. This second tube is very useful, but is not in itself a novelty.



Intra-tympanic syringe.

A, 1. Rubber bag. 2. Spoon-shaped metallic support. 3. Straight tube. B. Tube with curved nozzle, fitting on to 3.

The method of using this little instrument is sufficiently obvious; the whole is carefully filled with the warm fluid about to be injected, and, the air being expelled, the straight or bent tip, as may be desired, is inserted into the perforation, the meatus and membrane being well illuminated. By slight pressure of the thumb the reservoir is emptied, the stream being directed into the attic according to the position of the tip—straight forward or to one side.

In the same way the syringe may be used for the subsequent introduction of any instillations that may be deemed advisable, but for whatever purpose it is used, thorough cleansing and sterilizing after each sitting is very necessary; for this purpose I myself employ alcohol, which has the additional advantage of being non-corrosive.

Of course such an instrument as that which I have just described can only be used by the surgeon; for every-day use by the patient or his attendant I am in the habit of ordering a syringe with a fine metal nozzle, to the end of which, and projecting for about three fourths of an inch, is fixed a piece of very narrow rubber tubing. This tubing, being soft and pliable, may, without risk, be introduced into the meatus right up to the perforation, and, in using it, the nozzle of the syringe should be directed upwards and a little forwards.

I have been very gratified with the results which the two methods of treatment above described have yielded in my hands, but, at the same time, I cannot help thinking that there is yet much to learn with regard to the treatment of these troublesome cases, and that we ought to be able to look forward to a much larger percentage of recoveries than is at present obtained.

A CASE OF DEAF-MUTISM, WITH AUDITORY
ATROPHY AND ANOMALIES OF DEVELOP-
MENT IN THE MEMBRANOUS LABYRINTH
OF BOTH EARS.¹

By DR. ARNO SCHEIBE, OF MUNICH.

Translated by Dr. J. A. SPALDING, Portland, Me.

(With Plate I. of vol. xxii. German edition.)

I OWE to Prof. Bezold the two temporal bones here to be described and the notes on their macroscopic condition.

F. M., æt. 47 ; autopsy, March, 1883.

Clinical diagnosis : phthisis ; deaf-mutism.

General result of autopsy : Vocal cords normal ; laryngeal cartilages calcified ; at the posterior commissure an ulcer $1\frac{1}{2}$ cm long, partly extending into the arytenoid cartilage. Extensive fibrinous pleuritic adhesions. Left lung : Superior lobe has a large cavity ; lower lobe, numerous peri-bronchitic nodules. Right lung : Cheesy deposits, with gray and yellow peri-bronchitic nodules.

Dura mater adherent, and, on the anterior and middle cranial fossæ, thickly strewn with minute dark-brown dots. Arachnoid at the summit of the calvarium milky.

The innermost convolution at the base of both temporal lobes shows cystoid degeneration as large as a quarter of a dollar ; cysts developed at the expense of the brain, filled with a clear liquid, and the walls distinctly pigmented. The third left temporal convolution shows similar cystic degeneration, with walls distinctly pigmented. None of the cysts or any brain substance has been adherent to the dura.

¹ From the histological laboratory of the Pathological Institute in Munich.

The convex side of the right temporal lobe is sunken over a surface the size of a silver dollar, with serum beneath. There is nothing abnormal in the fossa Sylvii, although the overlying membranes are opaque.

The stria acustica consists of four fine fibres on the left side, and of but two on the right.

Microscopic examination of the auditory nerves in a fresh state fails to show any atrophy in the teased out preparations. All of the fibres have a medulla. No corpora amylacea present.

MACROSCOPIC EXAMINATION OF BOTH TEMPORAL BONES.

Naso-pharynx and both memb. tymp. normal.

Some labyrinthine fluid escapes on opening the superior semi-circular canal. Manometric examination shows normal mobility of the ossicles.

On removing the right tegment we see numerous delicate transparent cords and membranes running from the long process of the anvil in various directions, and especially a thick band-like double tendon, attaching the shank of the anvil to the *Mt.* The spot of attachment outside does not reveal any sinking inward of the *Mt.* The stapes is also circularly attached with many delicate fibres, but it yields abundantly to the slightest touch. Vascular congestion on promontory and in tube.

Left tympanum has but a single fibre running from long process of anvil to the *Mt.*, and a few fibres from the stapes to its niche. The round window in both ears is bridged over with a few radiating cords.

The labyrinths which had lain in 70 per cent. alcohol for seven years were now placed into 96 per cent. alcohol, then for twelve days decalcified in a 5 per cent. solution of saltpetre, then imbedded in celloidin and cut into sections perpendicularly to the longitudinal axis of the pyramid. The specimens were then finally compared with a number of similar preparations from normal ears hardened and decalcified by various methods.

The tissues thus prepared were found to be better preserved than after a brief hardening in strong alcohol. The cross-sections of the nerves were particularly beautiful, owing to the distinct coloration of the axis-cylinders. Grenacher's hæmatoxylin proved the best staining material.

HISTOLOGICAL CONDITION.

The cords and membranes in the *middle ear* did not impair the function of hearing. They were occasionally attached to the membrane of the round window, drawing it in a funnel shape toward the tympanum. The secondary drum-head and the stapido-vestibular symphysis were normal.

The *tensor-tympani muscle* is only half as thick as usual, and its bony canal is undeveloped, the measurements being about the same as in infants. Nevertheless the various muscular fibres are of normal diameter. Most of them are finely granulated, and show coarsely granular destruction and shrivelling of the muscular substance. The fatty tissue is somewhat largely developed at the beginning of the tendon.

Inner Ear.—The auditory and facial nerves have been torn from the right internal meatus. The process of dura mater is normal at the entrance into the internal meatus, but deeper in; the walls of some of the vessels are thickened, hyaline, and unstained. Additionally, the endothelia of the lymph spaces are excessively proliferated, so that the latter on cross-sections resemble glands. The interior of the periostrum contains corpora amylacea, varying in size and form. Yellowish-brown pigment also abounds. The left internal meatus contains a small piece of the normal facial nerve. The alterations, otherwise, are about the same as on the other side. The facial nerve in its course through the petrous bone is normal on both sides.

The *right cochlear nerve* is excessively atrophic in the tractus foraminulentus and further along in the lamina spiralis ossea, where the nerve fibres are scarce. They are most abundant in the first convolution (Fig. 3, *n*²), whilst there is no trace of them in the third convolution, although the appertaining bundle in the central canal is present though atrophic. The lost elements have not been replaced by connective tissue, but the affected spots are empty. The few remaining fibres exhibit irregular contours and slight granulations, alterations which may be explained by the action of the alcohol.

Rosenthal's canal in all the convolutions exhibits uniform and quantitative atrophy of the *ganglion spirale*. But the remaining cells are normal. In contradistinction from treatment with Mueller's solution the protoplasm, by shrivelling, has retracted from the endothelial membrane, exhibits granulation, and absorbs some of the staining material. Another remarkable alteration in this region is the appearance of lacunæ (filled with serum?) with smooth borders (Fig. 3, 1), though a few contain tissue fibres projecting into the interior. The enveloping membrane contains connective-tissue fibres, nerves, and ganglionic cells. The lacuna always lies next to the exit of the nerves into the lamina spiralis ossea, where normally there are but few if any fibres, so that it is due more to destruction of nerves than of ganglionic cells. Consequently we see the locality of the lacunæ in the first convolution occupied by thin nerve bundles.

The nerve and ganglion cells are much more abundant in the first convolution on the left side, together with some variations in the ductus cochlearis, which affect Reissner's membrane, Corti's membrane, and the stria vascularis.

Reissner's membrane seems to be absent on both sides, in the vestibular portion of the cochlea and the adjacent portion of the first convolution, unless represented by a membrane which lies close to the lamina in its whole extent, does not run over the ligamentum spirale,¹ but toward the modiolus. At the beginning of the basal convolution we can follow this membrane along the cochlear wall to the ligamentum spirale, and shortly after it raises itself from its base, and leaves free, in the angle between the lamina ossea and the wall of the cochlea turned toward the modiolus, a space, which in the right cochlea rapidly increases in size upward, leaving Reissner's membrane almost perpendicular to its normal direction, and closing the beginning of the scala vestibuli in a blind sac about the first convolution. Again in the rest of the first and in the second and third convolutions, the insertion of Reissner's membrane is abnor-

¹ By this I mean in the rest of this paper the entire semilunar stratum (Goltstein).

mal, the line of insertion at the lamina ossea running mostly along the normal position, whilst the other end is not attached to the stria vascularis, but at the upper periphery of the ligamentum spirale or farther inward at the periosteum of the bony wall. From here to the line from which it ought to spring the periosteum of the external cochlear wall and the adjacent lamina spirale, as far as the normal insertion of the membrane, is covered with a thicker layer of cells than usual (Fig. 3, between r and e). This is probably the continuation of Reissner's membrane, which has attached itself to the underlying surface.

Most of this membrane in the *left* cochlea presents itself lying fast attached to the lamina ossea and cochlear wall, and only lifted away in the angle between the two. The reclining or rather the adherent portion, as well as the free portion, contains much pigment, partly free, partly in large ramified cells. In some of the sections the membrane lies so close to the periosteum, that the ductus cochlearis occupies the whole half of the cochlea at the expense of the scala vestibuli. Reissner's membrane is also abnormally attached on the left side. In both, the membrane is excessively bulged forward toward the scala vestibuli (Fig. 4, r).

Corti's membrane is rudimentary here and there, and exhibits important pathological relations to the cells of the internal spiral sulcus. The latter are either in one layer as usual, and then higher than ordinary, or, what is oftener seen, they cover the sulcus in a double or triple layer with pigment. The cells which line the laminæ membranaceæ between the sulcus and Corti's organ are occasionally higher, or else they form a double layer. We also see a thin, deeply stained, and occasionally pigmented membranaceous layer of cells near the attachment of Reissner's membrane, beginning at the usual insertion of Corti's membrane. This layer extends over the end of the limbus and then sinks into a curve, where it unites with the outermost cells of the sulcus, and more frequently with the cells lying behind this and Corti's organ (Fig. 1, b).

Now in this shut-up space and filling it completely is

rolled up the rudiment of Corti's membrane without any insertion. In a few sections, it presses between the upper limbus lamina spiralis and the overlying cell membrane, where, however, it is not inserted upon the crista, but separated from it by a single layer of cells.

There is still another abnormality in the shape of a bridge, running directly to the stria vascularis (Fig. 2, br), and consisting of two plates of flat cells lying close to one another, yet leaving between them a narrow space partly filled with pigment granules. One of these plates is inserted into the upper surface of the crista spiralis, to which it is attached from its free margin to the usual insertion of Corti's membrane, while the other plate varies in its insertion. It may spring from all parts of the sulcus internus as well as from the membrana basilaris in its whole extent, as far as Corti's organ, and from all the cells of the same. Wherever seen, in the sections, it is this bridge which contains between its plates the rudiments of Corti's membrane, and we can follow its continuation into the curved above-mentioned cellular layer in which we found Corti's membrane imbedded. The situation of this membrane between the plates varies with the locality of the single plate. If this were inserted at Corti's organ or near by, then the rudiment would lie there. But if the plate arises from the first cells, so that both plates are inserted near one another, then Corti's membrane is found enclosed by the latter at some distance from the labium vestibulare of the crista spiralis (Fig. 2, m).

Corti's membrane is only normally located at the beginning of the first, and for a short space in the second convolution, provided that the cells of the sulcus internus are normal, but even in that case it is smaller, and has cells on its surface and occasionally in its interior. It was absent at some spots, but whether torn away artificially or not, we could not decide.

The anomalies of the *stria vascularis* were alike on both sides: totally absent at the foot of the first convolution, its place being occupied with a layer of epithelium greedily absorbing the staining material.

Another anomaly is a ridge-like elevation resting with a broad base on the stria (Fig. 4, 1), running close above the foramen spirale and keeping about the same distance all along its course. It is higher than the prominentia. The rest of the stria is covered with a pavement epithelium. The structure, papilla-like in transverse sections, consists of cells, pigment, vessels, and a few fissures between. The rest of the stria is normal, even in thickness, where the ridge is the thickest. This portion of the stria also contains fissures, so that there is but little left of the tissue of the stria itself. The contents of some of these fissures is stained.

The two plates of the bridge continue along the stria, the lower plate forming a prolongation of the ridge, whilst the upper one proceeds farther upward, so that we see between them a triangular space with a broad base (Fig. 2) and partitioned off at intervals into minute spaces by delicate fibres and cellular tissue.

The prominentia spiralis is normal.

Corti's organ is present in both cochleæ, but lower than normal, the pillars scarcely hinted at or entirely invisible. The cells are preserved in their normal connections, except in the middle of the first convolution on the right side, where the nerves are more atrophied than elsewhere. The cell envelopes are indistinct, the protoplasm stained but little despite alcoholic hardening. The hyaline globules in Corti's organ are pathological, extending to Claudius' epithelium. On the left side they have absorbed some staining material. The surface of Claudius' epithelium exhibits well stained globules quite different from corpora amylacea. The cells of the external sulcus are normal.

The *vestibule and semicircular canals* show less alterations than the cochlea.

Part of the nerve fibres of the nerve of the sacculus is lost, and between the rest lie corpora amylacea. The *posterior ampullar nerve* is atrophic, with large lacunæ between the bundles, and in its canal are amyloid bodies. The *external ampullar nerve* has lost few fibres; the *utricle* and *superior ampullar nerves* are normal.

The membranaceous portion of the *sacculus* cannot be

well studied in these sections. We can almost assert that the otolithic membrane is surrounded by a membrane of a single layer of cells, which on the surface turned to the lumen of the sac are flat, on the side toward the auditory epithelium cubical. Here the membrane is united in the middle with the macula by means of a thin pedicle, so that it looks like a mushroom. The cubical epithelium extends on both sides of the pedicle, and passes over into the tall epithelium of the hearing spot. The pedicle too is filled with minute hearing stones, which extend into the chief large mass of the otoliths with a few drop-like structures lying about.

The cubical epithelium, which forms the transition between the hearing and the pavement epithelium, contains interstices and round granules about half the height of the epithelium, which show by their reaction to the stain that they are different from the structures described in the cochlea, and the amylaceous bodies by staining violet instead of blue. As they imbibe Babes' saffron stain¹ they may consist of colloid.

The neuro-epithelium of the *utricle* with its hearing-hairs is well preserved. The interior of the epithelium contains a few colloid bodies. The hearing-spot is surrounded by a spongy membrane without otoliths. The outer wall of the utricle exhibits many changes, the upper layer of connective tissue being transformed into regular spaces filled with hyaline, whilst between are clusters of corpuscles resembling otoliths, but smaller and more uniformly arranged. Additionally there are cellular cylinders with walls of cubical epithelium, and containing material stained like colloid. One of these cylinders opens into the utricle.

The epithelium of the crista of the *posterior semicircular canal*, in correspondence with the well marked atrophy of the nerve, exhibits numerous colloid bodies. We see the same at the crista, though they are absent in the neuro-epithelium of the inferior canal.

The aqueducts of the vestibule and cochlea are normal.

¹*Virchow's Archiv*, Bd. cv., iii.

The labyrinth has a large amount of pigment even in the normal portions.

Résumé.—The *middle ear* is normal with exception of the hyperplasia and partial degeneration of the tensor tympani.

The *labyrinth* shows atrophy of the nerves of the cochlea, sacculus, and posterior ampulla, as well as alterations in the membranous structure of the cochlea and sacculus. The latter are simply anomalies of formation.

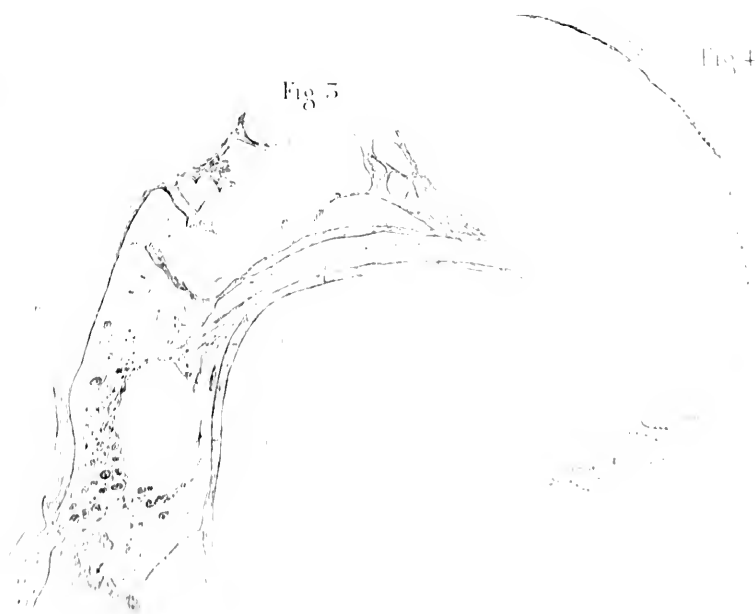
The inclusion of Corti's membrane in the cells of the sulcus internus was the remains of an embryonal stage. According to Koelliker the sulcus at a certain stage in embryonal life is filled with a very tall epithelium, upon the surface of which and of the crista Corti's membrane is formed as a cuticular exfoliation. In our case, the rudiment of the membrana tectoria is totally surrounded with cells so that its relation to the crista varies at spots. Whilst there we get the impression that Corti's membrane originated as a cuticular secretion; here it seems to develop between the cells themselves. Directly connected with this alteration in the internal sulcus lies the bridge which is stretched from the sulcus to the stria vascularis.

We also see how the ridge on the stria proceeds directly from this bridge. The formation of this abnormality, as well as the abnormal height of the stria vascularis elsewhere, reminds us that in embryonal life the part in question is pushed forward into the ductus cochlearis.

The abnormal insertion of Reissner's membrane may be either a disturbance of development, or something depending on the enlargement of the stria vascularis, which is considered as a secretory organ of the endolymph. We might imagine that permanent hypersecretion of the latter had pressed Reissner's membrane against the wall till it had gradually attached itself to it. But this is a supposition to be taken with much reserve.

The cell-holding otolithic membrane of the sacculus may also be recorded as an abnormality of development.

The deaf-mutism must be regarded as chiefly due to the *atrophy of the nerves*. But we cannot decide whether this is



to be referred to possible cerebral alterations since an examination of the long since misplaced brain was not made. The only thing of which we can be sure is that in the labyrinth there is no trace of any former inflammation, which in all the previously reported cases of deaf-mutism with auditory atrophy could be determined.¹

We ought to emphasize, in our case, that the atrophy was confined to the nerves of the cochlea, sacculus, and posterior ampulla—in other words, to those three branches which before their entrance into the petrous bone compose the posterior ramus (Retzius), whilst the nerves of the utriculus and of the other two ampullæ which compose the other trunk of the auditory nerve (anterior branch) are not distinctly atrophic.

Mygind's² compilation of deaf-mutes, to which three new ones are to be added, Schultze,³ Haberman,⁴ Largen and Mygind,⁵ and one overlooked by Mygind, Moos and Steinbrügge,⁶ contains no case exactly like ours. It is possible that some of the older sections in which the *macroscopic* investigation resulted negatively might have yielded similar alterations to a more accurate investigation.

Explanation of the Figures.

Fig. 1. *co*—Corti's organ¹.

z—Increased cells in the sulcus spiralis.

b—Arched layer of cells extending to the limbus laminæ spiralis ossæ.

m—Corti's membrane.

Fig. 2. *s*—Semilunar stratum.

c—Crista spiralis.

b—Basilar membrane.

co—Corti's organ, badly preserved.

p—Prominentia spiralis.

br—Bridge.

l—Lacuna in the stria vascularis.

¹ With exception of a single case reported by Politzer in his handbook.

² *Archiv. f. Ohrenhltke*, Bd. xxx.

³ *Virchow's Archiv.*, Bd. cxix.

⁴ *Zeitschrift f. Heilkunde*, Bd. x.

⁵ *Archiv. f. Otologie*, Bd. xxx.

⁶ These ARCHIVES, xii., 247.

ls—Ridge with attachment to lower plate of the bridge.

m—Rudimentary Corti's membrane.

Fig. 3. *r*—Rosenthal's canal.

la—Lamina spiralis ossea.

g—Ganglion cells.

l—Lacuna.

*n*¹—Entering nerve fibres.

*n*²—Departing nerve fibres.

b—Connective tissue.

Fig. 4. *s*—Stratum semilunare.

b—Beginning of basilar membrane.

p—Prominentia spiralis.

l—Ridge on the stria vascularis.

e—Flat cells on the rest of the stria.

r—A piece of Reissner's membrane bulged forward toward the scala vestibuli, inserted somewhat peripherally, and extending farther on in a thicker layer of cells.

FURTHER EXAMINATIONS OF THE LABYRINTHS OF SIX PETROUS BONES FROM CHILDREN WHO HAD DIED OF DIPHTHERIA.

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Translated by Dr. MAX TOEPLITZ, New York.

(*With Plate II. of vol. xxii., German edition.*)

THE following communications serve to fill up to some extent the deficiencies left in my former paper on bacterial invasion of the labyrinth following diphtheria. The material used for this purpose consists of the same six specimens which have been used for the examination of the corresponding changes of the middle ear (these ARCHIVES, vol. xx., p. 52).

THE HISTOLOGICAL ALTERATIONS IN THE LABYRINTH

could, in these six cases also, be based upon the immigration of the same micro-organisms, as in the affections of the middle ear, viz., micrococci and streptococci. In two cases, in a case of primary pharyngeal diphtheria of six days' standing (cp. Case 2 of the affections of the middle ear), and in a case of scarlatinal diphtheria of five days' duration (cp. Case 4, l. c.), the groups of micrococci were partially arranged in grape form, so as to suggest a mixed infection of staphylo- and strepto-cocci.

In addition I emphasize the following facts taken from my notes: Groups of cocci upon the external wall of the sacculus (Case 4), together with molecular products of disintegration, and also in the perilymphatic trabecular

reticulum of the utricle (4); furthermore micrococci and streptococci upon the ligaments of the membranous semi-circular canals (Cases 1, 2, and 6) in the layer of connective tissue of the crista of the sagittal ampulla (Cases 4 and 6), in the vessels of the Haversian canals imbedded in leucocytes and upon their vascular external wall (Case 1), along the endosteum of the first cochlear turn (about this later on), and between the layers of the lamina spiralis ossea, etc.

THE ALTERATIONS IN THE VASCULAR SYSTEM.

THE VASCULAR THROMBOSES

occur, as it is thus far generally agreed, in consequence of mycotic fatty degeneration of the endothelia; in incomplete thrombosis (developed perchance shortly before death) or when a portion of the thrombosis is already disintegrated, as, *e. g.*, in thromboses composed of leucocytes in the modiolus, the endothelia in fatty degeneration stained black with osmic acid may be found. They occur in the vessels of larger and smaller calibre. Thromboarteritis and thrombo-phlebitis of the larger vessels of the inner auditory meatus and of the Fallopian canal are not unfrequently found. In the thrombus itself the micro-organisms, partly free, partly imbedded in blood-cells, can be demonstrated. The hyaline degeneration of the external vascular wall in the facial canal probably depends upon immigration of micro-organisms from the tympanic cavity, which is favored by existing defects of ossification. The development of the vascular changes is here explained in the same manner as in those produced in animals after subcutaneous injection of *staphylococcus pyogenes*.

In addition to mycotic, fatty degeneration of the endothelia in diphtheria the poisonous products of metabolism, the *toxalbumin* (Brieger and C. Frankel) of the bacillus of diphtheria, probably play an important part. The globular stasis, the extremely great extent of vascular thrombosis over the entire petrous bone, especially in septic diphtheria, the frequent occurrence of hemorrhages, the changes of the red corpuscles, their great variety of form, principally their

shrunk appearance (cp. Fig. 13 in the diphtheritic affections of the middle ear), point to an injurious effect of the diphtheritic poison upon the walls as well as upon the contents of the vessels. There is scarcely a place in the petrous bone where such hemorrhages, probably due to toxic necrosis of the vascular wall, cannot be demonstrated, as, *e. g.*, in the periosteum of the carotic canal (diffusely), in the jugular fossa, the petrosal fossula, in the tracts of the acoustic nerve and its branches, along the endosteum of the first two cochlear turns, along the periosteum of the lamina spiralis ossea of the first and second turn, especially upon the tympanal surface, in the region of the vascular stria, in the facial canal, upon the ganglia, in the hiatus subarcuatus, in the osseous marrow at the different places of the cochlear duct, along the tympanal surface of the basilar membrane up to the spiral ligament, occasionally joining the hemorrhage at this place, furthermore in Corti's organ, in the cochlear aqueduct, etc. O. Silbermann's experiments¹ and de Ruyter's investigations² throw light on these conditions.

According to Silbermann, intravital thromboses occur also in poisoning produced by substances that dissolve blood corpuscles, viz., chloride of sodium, glycerin, pyrogallie acid, also arsenic and phosphorus, just as in the experiments of the Dorpat school after injections of leucocytes and of the stromas of the red corpuscles. Silbermann has even furnished the heretofore unknown proof of the constant occurrence of capillary thrombosis by means of intravenous injections of pigments into severely diseased animals (complicated with hemorrhages, and especially with hemoglobinuria). The parenchymatous organs were stained like marble, motley places changed off with unstained ones, etc.

De Ruyter tried by means of spectral analysis to trace the changes of the blood color in different infectious diseases. In some forms of severe sepsis, *e. g.*, inoculation

¹ "The Coagulative Action of Certain Blood Poisons," *Med. Centralbl.*, 1888, No. 16; and also, "Intravital Blood Coagulations, Produced by Certain Doses of Toxic Drugs and Other Substances," *Deutsche med. Wochenschr.*, 1888, No. 25.

² "The Relation of the Blood Color in Infectious Diseases," XVII Congress of the Deutsche Gesellschaft f. Chirurgie, second meeting, April, 1888, *Deutsche med. Wochenschr.*, 1888, No. 19.

of the virus of malignant œdema, after putrefaction of the blood a band could be observed in the spectrum, which bears certain relations to that of methæmoglobin. As in diseases produced experimentally, De Ruyter, in a series of cases of severe human diphtheria with marked septic symptoms, could also produce the changes of the blood color after the reduction of the blood, a result which was never arrived at with other blood. Further investigations should tend to prove whether the changes of methæmoglobin are dependent upon the action of ptomaines.

New-Formation of Blood-Vessels.

Their full description, illustrated by a drawing, will presently appear in *Virchow's Archives*. It was observed in Case 4 in the perilymphatic space of a semicircular canal; there existed a formation of vascular ramifications, arising from the adventitious cells of pre-existing vessels, probably in consequence of irritative phenomena caused by slow emigration of micro-organisms from the vessels, subsequent increase of microbes, coagulation of lymph, nuclear division and nuclear increase of the lymphoid elements, etc., probably mixed infection of staphylo- and strepto-cocci.

THE ALTERATIONS OF THE PERIOSTEUM IN THE DIFFERENT PARTS OF THE LABYRINTH.

The relation of the labyrinthine periosteum in infectious diseases excites our especial interest, for its vessels play a great, probably the greatest, part in the immigrations of the micro-organisms, and they participate in the changes of the periosteum, as well as in those of the adjoining tissues, the bone, the ligaments of the vestibular apparatus, the nerves, etc. The study of these changes in fresh cases is instructive for the better understanding of the genesis of the condition in such individuals, who die long after their recovery from the infectious disease.

In my first paper on bacterial invasion of the labyrinth in simple diphtheria I explained, with reference to the negative results of examination, the changes of the periosteum and of the adjacent bone from the "globular stasis" and

the "vascular thrombosis" respectively. I can no longer sustain this view, believing rather these changes to be due to *direct action* of the micro-organisms, the mode being identical with diphtheria of the cochlear capsula, as I have described it in the affections of the middle ear (cp. *l. c.* Figs. 3 and 13). The periosteum is corroded and destroyed by the micro-organisms, and the osseous necrosis becomes more extensive by their further emigration.

Just as in the above-mentioned paper the propagation of the osseous necrosis from the labyrinthine wall to the spiral ligament has been described and illustrated (*l. c.* Fig. 13), the entire process may take place in inverse direction, either from the internal auditory canal around the internal cochlear cavity toward the labyrinthine wall, or from the inner surface of the osseous semicircular canal in the same direction. If thrombosis of the periosteal vessels is associated with the bacterial action, the effects are enhanced and the bony destruction is the more extensive. The most extensive destructions of the bone were found in Case 2. There existed *numerous*, partly *communicating* necroses, developing from several places of the labyrinthine wall, which extended to the osseous limits of the vestibular apparatus and also to the spiral ligament, and around those arising from the internal auditory canal, laterally penetrated the cochlear capsule; the modiolus also was corroded in its entire transverse section.

The following results of examination are worthy of especial notice :

a. The condition of the periosteum of the osseous semicircular canals and of the ampullæ : These are by far the most frequent. I have described and illustrated them before (cp. Fig. 2, in simple diphtheria); the periosteum may be loosened to a great extent or entirely missing.

b. The condition of the endosteum of the first cochlear turn in Cases 1 and 2 : Enormous quantities of cocci were here found along the endosteum ; where the microbes were scantier, they exhibited distinct chain formations, osseous necrosis being at places therewith associated.

c. The condition of the layer of the lamina spiralis ossea :

Numerous streptococci were found between its layers (Case 2).

d. The condition of the periosteal layer of the spiral ligament (Cases 4, 5, and 6).

In consequence of the transmigration of microbes from the vessels of the periosteum of the spiral ligament (the innermost of its three layers), there develop alterations which are partially exhibited in individuals who die of other diseases long after the termination of the infectious disease. Three different degrees of destruction may be observed in these cases:

1. Disintegration of the greater part of the spiral ligament; later atrophy, or formation of lacunæ.

2. Development of a sequestrum of the adjoining cochlear capsule close to the periosteum. This sequestrum is crescentic and mostly parallel with the periosteal layer of the ligament.

3. The osseous necrosis progresses toward the labyrinthine wall which it reaches. This is favored in the cochlear capsule by the great abundance of cartilaginous islets which rapidly disintegrate. Laterally from the sequestrum numerous metaplasts are seen with cartilaginous cells in fatty degeneration, also necrosis of the cartilaginous capsules, which are followed (Case 6) to a great extent toward the inner tympanic wall by necrosis of the bone with sinuously corroded edges and streptococci in the sinuses.

e. The condition of the periosteum of the *vestibular aqueduct*: In the former description of the paths of invasion, I thought it possible for the microbe to enter the vestibular aqueduct from the dura mater along the fibro-periosteal connective tissue which lines the osseous vestibular aqueduct and "contains a number of minute interstices [Rüdinger], possibly corresponding with minute lymphatics" [Schwalbe]. The emigration of the micro-organisms from the blood-vessels of this fibro-periosteal connective tissue, which in fact takes place (Cases 1, 4, 5, and 6), presents a *new* and *direct* path of invasion of the endolymphatic space. As consecutive conditions destruction of the epithelium or small and giant nuclear cells and molecular products of disinte-

gration are found ; in Case 1 (septic diphtheria with enormous quantities of micrococci and streptococci, free and imbedded in cells) even necrosis of the osseous walls of the aqueduct was found.

OTHER ALTERATIONS OF THE PERIOSTEUM.

These consist in hyaline and colloid degeneration. The former is found principally in the region of the internal auditory and in the facial canal, the latter in the lining of the carotic canal and the jugular fossa, almost invariably associated with diffuse hemorrhages. In the facial canal I found the external vascular wall in hyaline degeneration so intimately connected with the periosteum in hyaline degeneration (Case 2) as not to enable me to recognize their boundaries. The periosteum may at isolated places present lacunæ in consequence of disintegration (facial canal, Case 2 ; carotic canal, Case 6).

Simultaneously with this decay *central* necrosis may develop in consequence of bacterial invasion into the bone corpuscles ; extent and severeness of this alteration depend upon the intensity of the infection. I shall mention as an example the result of examination of the transverse destruction of the modiolus.

THE ALTERATIONS OF THE BONE MARROW.

The micro- and strepto-cocci penetrate into the interior of the fat and medullary cells and produce colloid degeneration of the contents of the medullary space, or necrosis. Fragments of necrotic bone of the medullary space are found at places, imbedded in remnants of disintegrated marrow and large collections of margarine (septic diphtheria), and diffuse hemorrhages (Cases 1, 2, and 6), together with products of disintegration and colloid masses, associated with necrosis of the bone adjoining the medullary cavity, confluence of the medullary spaces, and streptococci arranged in series in the corroded osseous sinuses. Here and there the medullary spaces are entirely empty. The colloid degeneration may exceptionally comprise the entire marrow of the pyramid. This condition is extremely marked in osmium specimens, in which black-stained fat cells cannot be traced.

The vessels of the Haversian canals are either normal or thrombosed, or they contain streptococci imbedded in leucocytes, which are found also upon their outer vascular wall.

THE ALTERATIONS IN THE REGION OF THE LABYRINTHINE LIGAMENTS.

While, in former observations upon alterations in an opposite direction, I could trace the conditions consecutive to *irritation* — new-formation — as well as to *necrobiosis*, I missed in these six cases the condition of new-formation.¹ I found, however, but exceptionally direct nuclear division, without cellular infiltration or hyperæmia of the ligaments, and everywhere the appearances of *coagulation necrosis*, similar to the condition in measles; endothelia without nuclei, their disintegration, formation of granular cells, molecular products of disintegration, complete destruction of the ligaments, and consequently unusually frequent *collapse of the membranous semicircular canals* (cp. illustration), unless the endolymphatic space was filled with the molecular products of disintegration of its epithelial layer, and with apparently older collections of lymphoid cells. I believe, nevertheless, that in the former, and in these cases we have not to deal with microbes of different pathogenic character, but with *quantitative* differences only. The microbes were markedly more numerous in these six cases.

ACCUMULATIONS OF LYMPHOID CELLS IN THE PERI- AND ENDO-LYMPHATIC SPACES OF THE VESTIBULAR APPARATUS, AND THEIR METAMORPHOSES.

These mechanical consecutive conditions of the immigrated micro-organism were found four times among six cases. The specimens of Case 4 present beginning ossification in spite of the brief duration (five days) of the disease.

¹ The perilymphatic space of *one* semicircular canal excepted (scarlatinal diphtheria of five days' duration), with new-formation of vascular ramifications (cp. above). In the two other membranous semicircular canals there existed coagulation necrosis; one of them exhibited the collapse characteristic of this condition.

This is remarkable, for it proves, first, the marked tendency of petrous bones of children to pathological ossification, a fact which many years ago was first pointed out by Voltolini; secondly, that in diphtheria, the invasion of the microbes into the blood circulation (in accidental, not in specific, affections) may take place extremely early, even without necrosis of the pharyngeal mucous membrane, probably in the first hours. This view is supported by the fact that microbes like the *oidium albicans* (Merkel) or the tubercle bacillus (Merkel, Cornet) may penetrate through the normal epithelia of the mucous membranes. In diphtheria it is, according to Kolisko and Paltauf, quite probable that the virus of the specific diphtheritic bacillus prepares the intact epithelium for the invasion of accidental micro-organisms.

THE ALTERATIONS OF THE ACOUSTIC NERVE AND ITS BRANCHES.

We distinguish two large groups of alterations. The first group contains the *hemorrhages*, which I have observed four times among these six cases. With reference to the details I refer to my former publication. The second group contains two cases of mycotic nervous degeneration. A case (3) of primary pharyngeal and tonsillar diphtheria of one week's standing; another (Case 6) of relapse of scarlatina.

The destructions in the main trunk are enormous; it may be destroyed in its entire transverse section. The consequences for the peripheric nerve branches and the ganglionic cells consist in *interruption of conduction*, *atrophy*, or *complete destruction*. The axis-cylinder resists longest; in the last stage before its entire disintegration it is marked only by granules arranged like rosaries. In the *peripheric branches* of the acoustic, of course, the *mycotic degeneration* may appear *independently*. In Case 5 I could find it in the terminal apparatus of the crista of the horizontal ampulla.

Direct mycotic degeneration of the ganglionic cells also is possible. I have not observed the degeneration itself, in Case 6, however, I noticed the penetration of micrococci into the nuclei of Schwann's sheath and into the cellular substance of the ganglionic cells.

THE ALTERATIONS IN THE REGION OF THE COCHLEAR DUCT

are the consequences partly of more or less *considerable hemorrhage*, partly of a more or less extensive *coagulation necrosis*. Both conditions may be combined.

The main source of the hemorrhages is situated in the region of the *spiral* ligament, of the endosteum of the first two cochlear turns (in the third turn no endosteal hemorrhage was found), and also in the periosteum of the osseous lamina of the first and second turn.

The coagulation necrosis is the consequence of the immigration of microbes in great number.

ABSENCE OF REACTIVE INFLAMMATION.

In the description of the alterations in the middle ears of these six cases I have emphasized the absence of a tendency to suppuration. No trace of such a tendency was discovered in any labyrinth. Appearances of new-formation could nowhere be found, apart from new-formation of vessels upon a limited territory in the membranous labyrinth of Case 4, while this took place to a great extent in the former cases. Nevertheless, I do not believe that in the two series of investigations we have to deal with the action of pathogenically or biologically different microbes, but I am rather inclined to believe in a quantitative difference of the transmitted infectious germ or of its primary virulence, or of both combined (case of septic diphtheria).

We may succeed in the course of time, based upon Hans Buchner's¹ excellent investigations, in explaining the *absence of all inflammatory reaction*.

It results, among other facts from Buchner's experiments that the inflammation is one of the most potent protective means against bacterial growth, and that the production of an intense inflammatory reaction initiates the cure of a bacterial process. We could, therefore, be tempted to suppose that, in my cases, the absence of inflammation has

¹ "The Proteines of Bacteria and Their Relation to Inflammation and Suppuration."—*Centralbl. für Chirurgie*, 1890, No. 50.



Fig. 7a

avored the increase of immigrated bacteria, and in this terrible affection has thus indirectly contributed to the enormous destructions in the hearing organ.

Explanation of the Illustration. Plate II.

A portion of a sagittal section from the membranous horizontal semicircular canal, medial crus. Child two years old. Scarlatinal diphtheria. Five days' standing. Diphtheritic inflammation, with formation of pseudo-membranes in naso-pharynx and larynx. Necrosis of mucous membrane. *Hartnack* $\frac{3}{4}$.

The labyrinthine ligaments are partially destroyed, together with their endothelial lining; the membranous canal, therefore, collapsed. *K* bone, *P* periosteum, *L L* labyrinthine ligaments, *G* blood-vessel. Also, where the ligaments are still preserved, the cellular elements are wellnigh completely destroyed. In place of the nuclei of the layer of the connective tissue, molecular products of disintegration are seen. The same holds good for the epithelial layer of the membranous semicircular canal. Distinct structure of nuclei and epithelia of the membranous semicircular canal are only exceptionally observed with large magnifying power.

Clusters of products of disintegration are seen in the endolymphatic and also in the perilymphatic space. These cover partially the propria, which has thereby partially lost its sharp outlines.

A CASE OF INJURY TO THE EAR BY A STROKE OF LIGHTNING, WITH PERFORATION OF THE MEMBRANA TYMPANI.

BY DR. E. S. CLARK, OF SAN FRANCISCO, CAL.

George Walker, æt. thirty-four, residence Helena, Montana, consulted me September 25, 1891, presenting the following history : Last May, while riding in a buggy with his wife and child, he was struck by lightning on the left side of the head, it passing down the ear, along the neck and breast to the right arm, where it burned through the flesh, leaving the bone exposed, then passed out into the metal-work of the buggy. The horse was killed, as was also a cow standing near. The patient's wife and child, however, escaped uninjured. The external ear and the meatus, as far as could be seen by the attending physician, were burned superficially. The physician stated that the drum was injured. There appeared a discharge from the meatus, which was apparently cured in about ten days, by keeping the ear cleansed as well as circumstances would allow. He has been troubled with deafness and tinnitus ever since.

Stat. Præs. : Hearing, $h = \frac{c}{100}$. Auricle normal. Some desiccated purulent matter mixed with cerumen adhering to walls of meatus was removed ; the meatus then appeared normal. Memb. tymp. very much congested and thickened : about 1 mm from and below the inferior extremity of the manubrium a mass of dry, hard matter about the size of a pin-head was seen, which on removal proved to be hardened pus, with a small quantity of soft matter adhering to the inner portion. The memb. tymp. then presented a round perforation about 1.5 mm in diameter, the edges being somewhat thicker and more congested than the surrounding parts, with some serum oozing from the perforation. With catheter a clear perforation sound was heard ; middle ear dry ; no râles.

Carefully cleansed with cotton moistened with a one-per-cent. solution of carbolic acid, and, after drying, applied boracic powder.

Sept. 26th.—Meatus perfectly dry ; $h = \frac{4}{100}$; catheter forces out a trace of serum through perforation. Same treatment.

Sept. 29th.—Have used catheter daily ; the perforation has been gradually decreasing in size ; a small quantity of hardened serum was removed from its edges.

Sept. 30th.—Memb. tymp. only slightly congested ; perforation so small as to be scarcely visible, $h = \frac{6}{100}$.

Oct. 1st.—Perforation closed entirely ; with catheter tube well open, no perforation sound ; memb. tymp. pale almost to normal ; $h = \frac{10}{100}$. Patient desiring to return home, I permitted him to leave.

Oct. 27th.—I received a letter from him stating that the hearing had steadily improved, though his "ear seems to ring some yet."

In this case the drumhead may have been ruptured by :

1. The direct stroke of lightning.
2. By the actual cauterization of the entire surface of the external meatus and drumhead followed by suppuration, this afterwards penetrating into the middle ear.

I am inclined to the former belief, on account of the history given, as well as the condition of the ear when I first saw the patient.

REPORT OF CASES OF DISEASE OF THE MASTOID PROCESS. WITH REMARKS.

BY THE LATE DR. HY. FERRER AND DR. E. S. CLARK,
OF SAN FRANCISCO, CAL.

(ARTICLE IV.¹)

(With two wood-cuts.)

CASE 34, CONTINUED.—Removal of Posterior Osseous Wall of the External Meatus ; Cure in Four Weeks.

From December, 1888, to February, 1889, the boy has been going to the German Hospital at irregular intervals to have his ear syringed by one of the nurses. I was absent during that time, but on my return I had the opportunity, February 12, 1890, to examine him again.

Status Præsens : No discharge on cotton taken from the external meatus, but on removal of the same a very fetid odor was noticed. On the mastoid a cicatrix parallel to posterior insertion of auricle depressed in its centre with a small fistulous opening in which a probe can be introduced two or three milli-

¹ Continued from page 182, vol. xviii., of these ARCHIVES.

Article i., vol. xvii., p. 308 ; article ii., vol. xviii., p. 25 ; article iii., vol. xviii., p. 139.

The MS. was accompanied by the following letter :

Aug. 17, '91.

Dr. H. KNAPP,
New York.

DEAR SIR : Enclosed I send you the remainder of Dr. Ferrer's mastoid cases (Nos. 34-60 inclusive). The first lot—34 to 44—Dr. Ferrer himself had completed before his death. The remaining sixteen I have written up partly from the Doctor's notes and partly from memory, having assisted him in the operations of the last thirty-five cases, and treated most of them for a greater or less length of time.

Whatever has been written by myself I have placed in parentheses and signed my own name. I am, etc.,

E. S. CLARK, M.D.

metres. The external meatus narrowed by collapse of its walls, therefore no details of fundus are visible.

I was satisfied from the above condition that there was still caries in the depth, and I therefore decided to operate after Küster in order to put an end to the long and tedious treatment.

Operation.—Ether narcosis. The usual antiseptic precautions taken, the auricle was detached from its insertion by a semicircular section. With an elevator I then detached the entire cutaneous wall of the external meatus from its osseous portion as far as it reaches. The auricle, as well as the cutaneous portion of the external meatus, was then drawn forward with a strong retractor, thus laying bare the entire posterior osseous wall. The periosteum also was drawn backward, exposing a defect in the external plate of the mastoid. This is the opening made by the first operation; it was found covered with granulations and cicatricial tissue. I then proceeded to chisel off the posterior osseous wall of the meatus, removing it in layers from upward downwards and from downward upwards. When at a depth of nearly two centimetres I scooped the cavity of the mastoid, which was filled with granulations, very fetid pus, and cheesy substance. The remainder of the osseous wall of the meatus was then removed, partly with chisel and mallet, partly with a special pair of bone forceps I had constructed for this purpose. The loss of substance thus produced was large enough to enable me to feel its deepest portions with my little finger and to remove with my forceps whatever particles of bone projected. This work was continued until I was convinced that the entire posterior wall was removed as far in as the cavum tympani and aditus ad antrum. I then divided the cutaneous portion of the meatus by a section running from its insertion into the cartilage to its innermost end. This was done in order to prevent retention of pus between the cutaneous meatus and the cavity in the mastoid, and in order to facilitate the adaptation of the skin to the walls of the cavity. The operation was an exceedingly neat one, with hardly any hemorrhage until the cutaneous wall of the meatus was divided.

To avoid tedious repetitions which are unnecessary in the precise report of mastoid operations, I will only briefly mention the general course pursued in the after-treatment. There was no reaction whatever, the boy remaining in bed two days suffering from the after-effects of ether. There was no more discharge

than would be expected from such a surgical operation, and it had no fetid odor. The meatus and the mastoid were irrigated daily with carbolized water and filled with iodoform gauze. The cavity in the meatus began to granulate, the gauze was then dispensed with, the auricle becoming firmly attached to its posterior insertion, leaving a linear cicatrix. The external meatus began to widen, extending backwards into the mastoid. The external orifice of the meatus was thus its narrowed portion as it gradually widened in its deeper portions. Still the fundus did not exceed much over one centimetre in diameter, all the walls as well as the fundus (external osseous wall of the labyrinth) being lined with epidermis. March 26th he was discharged and advised to call twice a week. To-day, March 31st, the cotton pellet, left in since the 26th, is perfectly dry, and on mopping with cotton at the end of a cotton holder very little moisture is obtained.

Professor Küster, of Berlin, in his article ("Ueber die Grundsätze der Behandlung von Eiterungen in starrwandigen Höhlen," etc., etc., *Deut. med. Wochenschrift*, 1889, No. 10, u. ff.), condemns Schwartz's method of operating and after-treatment, and recommends two ways of operating. He subdivides the cases of affection of the mastoid into two classes, the one in which the disease is entirely restricted to the mastoid, the middle ear being free, and the second, in which both middle ear as well as the mastoid are implicated. For the cases in which the mastoid alone is affected he advises a way of operating which, in its description, differs from Schwartz's method only in the use of a chisel instead of a gouge. This can be seen in the large number of cases recorded by Schwartz and his pupils, also by myself in these ARCHIVES. Schwartz's method in general is to remove all of the bone that is diseased, even going beyond the limit of the antrum, as I have seen myself. In the second category of cases, in which the affection is in the middle ear as well as in the mastoid, Küster advises the entire removal of the posterior osseous wall as far as the membrana tympani, or even beyond this. In the first case he applies one drainage tube, passing it into and out of the external meatus; in the second case he introduces two drainage tubes, one in the meatus, and one in the mastoid. This operation differs entirely from

Schwartz's or anything ever done before, and I do think that it will shorten the treatment of chronic cases, provided that all affected portions of the bone have been reached by this method. We must not forget that the anterior osseous wall of the cavum tympani as well as the air-cells above the same are often the seat of the affection, and are not reached,

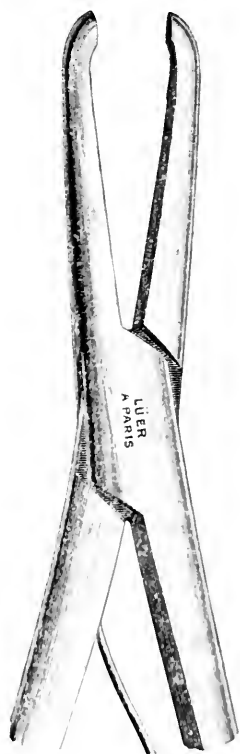


FIG. 1.

or imperfectly so, by Küster's method of operating. To remove pieces of the attic Hartmann has constructed a special instrument, which he demonstrated at the last meeting of naturalists in Heidelberg, September, 1880, and which, according to the pieces removed by the same, may do good service.

In May, 1889, I had the honor of being the guest of Professor Zaufal in Prague, and saw him operate two cases

after Küster. Here I first conceived the idea of using a bone forceps for working in the depth, especially used by Zaufal to remove the anterior portion or the ring of the aditus ad antrum. The branches of the forceps were too short and too weak, and I was present when the operator broke one of the branches in trying to remove that portion of the bone.

The forceps I use (Fig. 1) and which I had constructed by Wulfing (Luer's successor) in Paris, has very long branches and is much stronger than the one of Zaufal, though sufficiently delicate to allow snipping off a piece of bone of 5 mm, if necessary, by an orifice in the mastoid of 15 mm and a depth of over 4 cm, if required. The length of the cutting branches is 43 mm, and their cutting end as represented in Fig. 2 in natural size.



FIG. 2.

CASE 35.—Profuse Fetid Chronic Otorrhœa of Right Side ; Operation Followed by Facial Paralysis ; Temporary Relief.

Joseph R., æt. fifteen years, came first for advice December 6, 1887, accompanied by his mother. The boy had had a purulent discharge from the right ear for the last three years or even longer, and no attention had been paid to it until lately, when for the first time he began to complain of pain in as well as behind the ear.

Status Præsens : Externally, nothing abnormal. The mastoid region somewhat sensitive to pressure, but not swollen. The meatus filled with very fetid dark discharge. After syringing, the membrana tympani was noticed almost entirely destroyed, some granulations filling up the middle ear, and no trace of the

ossicles. With the catheter the Eustachian tube was found perfectly free. No denuded bone could be felt with the probe.

The treatment consisted in daily syringing the external meatus with a $2\frac{1}{2}\%$ solution of carbolic acid, and syringing through the catheter with a weak solution of sodium chloride. Some of the granulations were removed partly with the snare, partly cauterized with nitrate of silver or chromic acid. This treatment was continued until the 13th of February without any material improvement. The granulations would form almost as rapidly as destroyed, and the discharge remained very copious and fetid. Classifying the case under the fifth indication for operation by Schwartze, I sent patient to the German Hospital, and operated on the 13th of February.

Operation: Ether narcosis, incision 4 to 5 *cm* long through the normal soft integuments. The periosteum well adherent was pushed aside. The external surface of the bone was perfectly normal. Near the posterior wall of the meatus the emissary openings were manifold; but neither the linea temporalis nor the spina supra meatum was well defined. After taking the necessary orientation I began to chisel, making an opening about 0.01 high and 0.006 wide. The bone was exceedingly compact, the external plate 3 *mm* thick. I penetrated into the bone 2 *cm* without finding any air-cells. At this depth the finest chisels (Schwartze's 3 and 4) were used to a depth of $2\frac{1}{4}$ *cm*. Here the bone substance had gradually become somewhat softer and of dark color, and by means of sharp scoops I penetrated to a depth of $2\frac{1}{2}$ *cm*. During the entire operation careful observations as to the topographical relations and depth were repeatedly taken. Patient was then allowed to come to, in order to try forced injections, but no communication was obtained. Antiseptic dressing was applied.

February 14th.—Patient in bed, at once I noticed that he had partial paralysis of the right side of the face. Temperature last night 37.2° C., this morning 37.4° . The bandage being saturated with blood, it was removed, the wound and meatus syringed with carbolic water, and fresh bandage applied.

February 15th.—No fever. He groaned considerably during the night, complaining of pain in the ear. The mother, resident physician, and myself remarked that the facial paralysis was much less. When the bandage was removed a very fetid odor was noticed, but the discharge from the meatus had perceptibly decreased.

February 17th.—Same condition. On the 18th he was allowed to promenade in the sun, and on the 19th he left the hospital, to be treated from now on as an out-door patient.

February 22d.—He has been treated daily in same manner. The wound is granulating nicely. The facial paralysis has remained unchanged. The discharge from the meatus is as fetid as ever. I syringed with a solution of sublimate, 1:3000, per tubam with the catheter, which produced a considerable smarting sensation in the throat for a couple of hours. In carefully probing the cavum tympani I failed to detect any necrosed bone. No communication has been obtained by forced injections.

February 29th.—Patient has been treated daily. His external meatus was syringed with sublimate and tartaric acid (Kretschmann's mixture) and sodium chloride per tubam with the catheter. The wound in mastoid is closing rapidly, and therefore a lead nail $1\frac{3}{4}$ cm long was inserted and held in by a spring.

March 3d.—No special change in condition of the ear, the wound fitting tightly around the nail. The fistula now is 2 cm deep. The facial paralysis has increased. Dissatisfied with the condition of things, I decided to scrape the fistula again, which I did without narcosis, penetrating as far as $2\frac{1}{2}$ cm, and enlarged the fistula in the bone. Even now no communication was obtained, and a nail $2\frac{1}{2}$ cm long was inserted.

March 4th, 5th, and 6th.—Had some earache during the night.

March 21st.—Has been attended daily. To-day the nail was shortened. The discharge from the meatus has not decreased, but is less fetid.

April 1st.—The general health of the boy has improved very much. I removed the nail and in a very few days the fistula closed entirely.

April 16th.—The discharge from the meatus and the fetid odor have ceased entirely. To-day the catheterization was followed by some hemorrhage. As the air passed with difficulty, I supposed that a foreign body, a sequestrum, had been displaced by the pressure of the air, but probing carefully I failed to detect any.

May 21st.—The discharge is now minimal, and patient will be treated every other day. The facial paralysis, which is complete, has been treated with electricity without any beneficial effect.

August 8th.—While having the electricity applied, patient com-

plaints that he does not feel it, and also complains of loss of sensibility over the entire body. He was examined first by pinching with a pin, and it was found that the sensibility was very much reduced, especially in the lower extremities. He feels dizzy and light-headed all the time, and almost drops from the chair when the catheter is applied. At times there is some greenish discharge of peculiar odor from the meatus. During the month of October he was treated with creolin instead of carbolic acid or sublimate, without any material benefit.

During the first half of 1889 he has been treated once a week, then at an average once a month, remaining about in the same condition, with little but still very fetid discharge. The facial paralysis has remained the same. He is attended at home by syringing with lukewarm water and instillations of sublimate alcohol 1:1000.

As mentioned above the indication for operating in this case was the fifth of Schwartz ("Die Chirurgischen Krankheiten des Ohres," page 333). The eburnation of the mastoid process was probably the result of the chronic otorrhœa and is of frequent occurrence. There is no doubt that the caries was situated more deeply, and that even to-day the patient is in great danger. As two efforts were made to reach the antrum or to obtain communication with the carious parts, and both times were a failure, the question occurs to me whether Schwartz's method was the one to adopt in this case, or whether after finding the above-described condition of the bone it would have been better to follow Küster's advice, to chisel away the entire posterior wall of the external meatus, and thus with less danger and more certainty reach the antrum. Küster's advice is undoubtedly a good one for chronic cases, and surely the one I will follow in this one if another operation is required. When after beginning to operate, according to Schwartz, a certain depth has been reached without entering the antrum, the safest way is to follow Küster's advice (*l. c.*) to chisel off the posterior wall of the external meatus, and to end the operation according to Dr. Karl Wolt "as if the external meatus was enlarged backwards."

A very unfortunate accident in this case was the facial

paralysis, setting in a few hours after the operation, and which was surely of a traumatic origin. Traumatic lesions of the facial nerve are of frequent occurrence during mastoid operations, and are easily explained when we bear in mind that, as a rule, we have to penetrate to a depth of from 20 to 25 *mm* to reach the antrum, and that, according to the recent researches of Dr. Hartmann ("Personal Notes Taken at the Sixty-Second Meeting of Naturalists and Physicians in Heidelberg, October, 1889,") who has investigated a large number of bones, the facial nerve is often reached at a depth of 17 *mm*, and that it averages 22 *mm*, measured as well from the spina supra meatum as from a point 1 *cm* behind the spina, which area is the one ordinarily selected for operating.

The partial loss of sensibility over the entire body, as well as the prolonged dizziness, shows that the process has advanced far enough inward to produce central nervous disorders, which I will not endeavor to explain. This loss of sensibility, as well as the dizziness, has been of intercurrent character, and at present the patient is entirely free from it.

Very unusual was the hemorrhage which followed an insufflation of air through the catheter. I use for this purpose Lucae's double bulb as modified by Bezold, and to which I have altered the valves in order to obtain a continuous stream. The pressure of the reservoir bulb when pumping, with the lower one is sufficient in most cases, and only when strong resistance is met with by compression of the filled reservoir with the right hand pressing it against my side, I am able to surmount obstructions and open the tube in the most obstinate cases. In this one the tube was always so free that in syringing through the catheter (after Schwartz) the fluid ran from the meatus in a stream. On this special occasion, after the resistance was overcome by strong pressure on the reservoir bulb, the air passed freely accompanied at the second insufflation by a free outflow of blood. When the catheter was removed it was not stained with blood, showing that the hemorrhage did not originate in the orifices of the tube or in the tube itself. My first

impression was that a small sharp sequestrum had been displaced by the force of the air that it produced the hemorrhage. After carefully syringing until the hemorrhage had stopped and the middle ear was carefully dried I made a thorough investigation by probing, but failed to detect any rough bone or sequestrum.

CASE 36.—Acute Purulent Inflammation of the Left Middle Ear; Operation; Empyema of Mastoid with Extensive Destruction of Bone; No Communication; Cure in Four Months.

H. P. L.—, forty-five years old, had been under treatment with his family physician for the last six weeks with profuse discharge from the left ear accompanied by pain. January 26th, he having complained of pain behind the ear, his physician fearing some mastoid complication advised him to apply to me.

Status Præsens : Left auricle normal, the mastoid region œdematous and sensitive to pressure. In the external meatus some fluid pus. After syringing and drying, the lumen of the meatus was found normal except in its innermost portion where it was constricted and injected, thus preventing a full inspection of the membrana tympani. A pulsating drop of pus could be seen at posterior and lower segment. With the catheter under strong atmospheric pressure, air penetrated the tuba but no perforation sound could be heard; the same result by inflating with Politzer's method. A pellet of absorbent cotton was introduced as far as the memb. tympani to act as a drain. The mastoid and part of the occipital regions were shaved and a strong ointment of iodine in lanolin thoroughly rubbed on the same. A Priessnitz bandage was then applied. Patient has no fever, his complexion is yellow, but he sleeps well, and has a good appetite.

January 27th and 28th.—Same condition, the discharge being very free. The mastoid region being still œdematous and sensitive to pressure I advised patient to submit to an operation the following day.

January 29th.—Patient had a good night's rest; the discharge from the meatus, the swelling and sensitiveness of mastoid region much decreased. He consequently requested me to postpone the operation.

February 3d.—He has been feeling better every day, the

discharge has been decreasing under the same daily treatment. The pain having ceased the moist bandage was exchanged for a dry one.

February 4th.—He complains of stiffness of the neck, the mastoid region more swollen, the swelling extending down the neck, and is also more sensitive to pressure. There is no discharge, and the meatus is more constricted. Inflations have been tried daily as well with the catheter as by Politzer's method without obtaining perforating sound. Frequent instillations of a warm boracic solution, repeated every two hours, were ordered and during the intervals Priessnitz moist bandage.

February 5th.—He had pain in the ear and over the left eye. Swelling and sensitiveness of mastoid the same. There is to-day some discharge in the meatus. Continued with same treatment, and urged patient to submit to an operation.

February 6th.—Patient had a good night's rest, the swelling of mastoid region less, and more discharge from the meatus. In blowing his nose he feels the air penetrate into the ear, but neither with catheter nor by Politzer's method am I able to obtain perforation sound.

February 17th.—His condition has remained about the same, with intermittent good and bad nights. There has been but very little discharge, and also intermissions in the swelling of both the meatus and mastoid region. Though no marked elevation of temperature has been noted, his general health is now bad, the tongue is coated, he has no appetite, and is mentally very much depressed. He decided to go to the hospital and be operated on.

February 18th.—The usual preparations of shaving and disinfecting were first carried out. Ether narcosis. Incision close to posterior insertion of auricle into the bone, the soft parts being at least half an inch thick. This was followed by considerable bleeding, parenchymatous as well as from distended blood-vessels, necessitating four ligatures. Compression with a sponge was used until the bleeding had subsided. The periosteum, which was well adherent to the bone, was pushed aside. The external surface of the bone of normal color. The mastoid had an abnormal shape, besides being very large. The spina supra meatum was fairly defined, but the prolongation of the linea temporalis (tuber mastoidei) formed an irregular tuberosity with its lower edge projecting over the surface of the mastoid proper.

On the surface of the latter, almost covered by the edge of the tuberosity, were a number of openings for the emissary veins. I began to chisel away the projecting edge of the tuberosity, and then chiselled out an oblong piece of the external plate. At 2 to $2\frac{1}{2}$ mm depth I came to a small cell filled with cheesy substance, and which had no visible communication with any other cavities, at the depth of 3 or $3\frac{1}{2}$ mm fetid pus began to ooze out. Exploring with a probe I found that the entire mastoid was transformed into a large cavity. After enlarging sufficiently the opening made with the chisel, I used Luer's bone forceps and removed the entire external plate as far as the sutura mastoideo-occipitalis and downwards to the apex of the appendix. The external plate was hard, apparently normal, averaging 3 mm in thickness. The defect thus produced measured 0.035 in vertical, and 0.025 in horizontal, direction. Directly under the external plate was an accumulation of decomposed fluid pus; the contents of the mastoid consisted partly of a cheesy and of a soft granular substance, and but few remnants of trabeculæ. All this was carefully scraped out, and the cavity thus obtained was astonishingly large, its external walls had been thoroughly removed in order to avoid any retention of pus. During the operation carbolized water was used. No communication was obtained. Temperature in the evening, 37.9° C.

February 19th.—He had some opiate during the night on account of restlessness. This morning temperature 37.4° . The dressing being saturated, but dry, was partly removed; the layers of iodoform gauze which were in the cavity of the bone were not disturbed. No discharge from the meatus. Fresh bandage applied.

February 23d.—He has been dressed daily. Patient has had no fever, and he feels perfectly well, and was able to sit up today. There is considerable purulent discharge from the mastoid, but none from the meatus. Sublimite was used in dressing instead of carbolized water. The posterior surface of the cavity begins to granulate, and the swelling of the soft parts is somewhat diminished.

February 24th.—The bandage became loose during the night, and was applied by the resident physician who held the auricle displaced, producing pain and discomfort all night. The consequence was that the parts around the auricle were found very œdematous. After he was dressed carefully, the pain ceased.

February 26th.—Yesterday and to-day he is in perfect condition, and walked in the garden. The cavity in the bone is granulating nicely on all sides.

March 1st.—The granulations in the cavity are dark-red and sluggish; after cleansing they were cauterized with a 5-per-cent. solution of nitrate of silver.

March 2d.—Cauterization had good effect and was renewed. Patient leaves the hospital to be treated from now on as an out-door patient.

March 3d.—Called at office. Memb. tympani thickened, of dull-red color; no perforation visible; h., 0.025.

March 21st.—He has been attended daily; the granulations, very soft, have been frequently cauterized or superficially scraped with a sharp scoop. The cavity is still 0.015 deep; h., 0.075. He now attends to his business.

April 12th.—The granulations from the soft parts have gradually extended into and are filling the cavity. To-day the cicatrization from the edges has proceeded so far that it was found necessary to apply a conical lead nail of 0.02 long and 0.01 wide at base, which was naturally held by a spring, and the usual roller bandage dressing dispensed with.

April 13th.—The nail has produced considerable œdema of the parts and discomfort. The reason for this was that it had to be introduced with considerable pressure. After cleansing, it was inserted again.

April 15th.—The opening in mastoid is very much larger than if produced by sloughing of the granulations, measuring from $1\frac{1}{2}$ to 2 cm in diameter. The œdema is very much reduced. The granulations appear very pale. Same treatment.

May 23d.—Patient has been in the country since the 19th of this month attending to some business, and he has neglected his ear entirely, not even changing the dressing. The discharge has increased very much.

June 12th.—He has been treated daily, occasionally the soft granulations have been superficially scraped. To-day the wound is almost closed; it was covered with plaster.

June 15th.—Wound completely closed. Patient dismissed.

The protracted recovery in this case must be attributed to the large cavity in the bone. As I have already demonstrated before by the post-mortem examination in case No. 6

of this series, the defect produced in the mastoid is covered by the formation of a dense connective tissue without the least trace of bony substance. After such a great loss of substance in the mastoid region where the destructive process has extended as far as the innermost layers of the skull and even partly impaired these, the foundation for the budding of granulations is very poor. These granulations, after having obtained a certain thickness, are, consequently, poorly nourished, appear pale, and have a tendency to decay. The main material for covering such an extensive cavity must be expected to proceed from the external skin and the periosteum, and everything therefore must be done to facilitate this process by removing all the undermined portions of the external plate, thus avoiding all sharp edges of the bone. In this case the cavity obtained in the mastoid was well adapted for this mode of reparation, but by filling the cavity too densely with gauze, the edges of the external incision had become dry, probably partially covered with epidermis, and it was only after frequently scraping them superficially or cauterizing, that they began to granulate. These granulations, spreading over the edges of the bone into the cavity, soon filled the same, and after the usual retraction had taken place very little depression was noticeable.

CASE 37.—Acute Purulent Inflammation of the Left Middle Ear ; Mastoiditis by Eburneation of the Bone ; Operation, Obtaining Communication without Finding the Antrum ; Cure in about Five Months.

A. A., thirty-two years old, from Murray, Idaho, consulted me February 22, 1888, stating that on February 16th, in the evening, he was taken with severe pain in the left ear, and the following day it began to discharge profusely. Ever since he has been applying hot poultices to relieve the pain, but without effect. He is unable to sleep, and the discharge has been increasing. Patient, a strong, well-developed man, has never before been sick, nor has he ever had any affection of the ears. I found the meatus filled with muco-purulent discharge ; after removal of the same by syringing and drying, the membrana tympani very much injected, with a small pulsating perforation upwards and

backwards. The mastoid region was œdematous, but not sensitive to pressure.

Treatment.—The perforation was enlarged downwards, and after inflating and syringing with a 2-per-cent. carbolized solution, a Priessnitz bandage was applied. This was followed by immediate relief.

February 23d, A.M.—He had but little pain during the night, but he did not sleep. There is very profuse purulent discharge. Same treatment as yesterday.

February 24th—Copious discharge, swelling of mastoid region, and pain upon pressure. Same treatment. Advised patient to go to the German Hospital, where I saw him in the afternoon and ordered one third of a grain of morphia at bedtime.

February 25th.—He had no pain, but could not sleep. The discharge and swelling not having decreased, I decided to operate at once.

Operation.—Ether narcosis. Dr. J. F. Morse kindly assisted me. After the usual preparations I made an incision parallel to the posterior insertion of the auricle, several centimetres long, through the soft external integuments, which were œdematous and slightly infiltrated. The periosteum was firmly attached to the bone and pushed aside, exposing the external surface of the latter, which was normal. Spina supra meatum well developed, but the multiple openings for the emissary vessels were unusually far forward and were situated in the anterior surface of the posterior wall of the external meatus. This made me suspect already an abnormal condition of the bone. The linea temporalis also, though marked, was very flat and broad, making a short curve upwards. I began to work with chisel No. 1, but after penetrating one centimetre through very dense bone substance I had to resort to finer instruments. At the depth of two centimetres the bone had not changed its character, I penetrated carefully still deeper, and had reached over $2\frac{1}{2}$ cm when I gave up the idea of finding the antrum. While the bone as far in as 2 cm. was almost like ivory, white and bloodless, I noticed that in deeper portions it was more injected and slightly softer. At this depth, in such high degree of eburnification, it would not be wise to use a broad chisel. Here, as a rule, the operation is ended with the finest chisel, with 2 mm width at the edge, but before ending, when it is thought dangerous to proceed with the mallet, the chisel can be used as a drill by making rotatory motions.

In this manner the canal is somewhat enlarged, its edges smoothed, and the character of the deeper-seated portions of the bone often ascertained. This manipulation is very much used in Schwartz's clinic, and I even recollect a case in which on the point of being abandoned the antrum was thus reached. Patient was then allowed to come to, a forced injection in the meatus was tried, but no communication obtained. After syringing and cleansing, the cavity in the bone was packed with iodoform gauze, otherwise dressed and bandaged as usual, with necessary precautions to prevent the wound in mastoid from being infected by the discharge from the external meatus.

P.M.—Patient complains about dull pain in the head, and he was allowed one third grain of morphine at bedtime.

February 26th.—Mrs. A——, who was taking care of her husband, informs me that he was very restless the first part of the night; he got up several times and walked the floor, complaining about great pain in the head. The resident physician gave him some morphine, which produced rest towards morning. Patient tells me that the pain was entirely located in the left side of the head, but that it was not as severe as the night previous. This morning he looks much better; he rested well, feels stronger, and has no pain. The bandage was removed and found dry, the discharge from the meatus so much decreased that it had hardly saturated the gauze which was placed in it. The gauze filling the mastoid was removed, and its deepest portions showed slight signs of purulent discharge. After irrigation with carbolized water the mastoid was dressed in same manner; the meatus was carefully dried after inflating and syringing and filled with absorbent gauze. Same dressing.

February 27th.—He had considerable pain during the night, no fever; one third of a grain of morphine had no effect until morning, when he suddenly felt much better and slept a couple of hours. This morning he looks better and feels stronger. There was but very little pus in the meatus, but the gauze in the mastoid was saturated with it. Irrigation was used, but no forced injection, because the patient felt faint during the dressing. Prescribed three grains of hydrarg. cum creta.

February 28th.—He had less pain last night. Temperature 38.5° C. No opiate. Little discharge in the meatus, more in the mastoid. Forced injection of carbolized water into the meatus, passing well through the mastoid. Same dressing.

February 29th.—Fair night, hardly any pain, no fever. Forced injection with same result as yesterday, same dressing. He will get up a couple of hours.

March 1st.—Sharp pain during the first part of the night requiring an opiate. The meatus is almost free from discharge; same amount from the mastoid. With forced injection the same communication exists, but its exact place cannot be ascertained on probing.

March 6th.—The last few days he had more or less pain, but the general improvement is well perceptible. The cavity in the mastoid is granulating nicely. To-day he leaves the hospital, and he will from now on be treated as an out-door patient.

April 14th.—Patient has been treated twice daily till March 18th, then once daily. Lately the discharge from meatus has had a serous character. The memb. tympani, still inflamed and thickened, shows a perforation 3 mm in diameter situated in post. sup. segment.

April 21st.—The cavity in the mastoid is so much reduced that I left off packing it with gauze. He has had the same treatment daily, and gradually the communication between cavum tympani and mastoid has stopped.

May 7th.—Business compels patient to leave for his home. He has now no more discharge from the meatus, but the perforation, though small, still exists. The tuba has always been found very free when inflating with the catheter. On the mastoid is a well marked depression; the external opening of the fistula is slit-shaped and about $1\frac{1}{2}$ centimetre deep. Patient will be dressed daily by his wife with a 2½-per-cent. carbolic water and the necessary antiseptic precautions. When at home he will apply to his family physician. As he informed me later on he treated himself for about two months before the mastoid was entirely closed, and adds: "The hearing is now almost as good as before," etc., etc.

CASE 38.—Chronic Otorrhœa of Right Side; Caries of Mastoid Accompanied by Delirium; Removal of Posterior Osseous Wall of the External Meatus; Cure in Six Weeks.

John A. L.—, 25 years old, has had otorrhœa in right side since he was seven years of age. Two years ago he had a swelling behind the ear, which was incised by a general practitioner, and the after-treatment carried on by a specialist. On the 19th

of March, 1888, Dr. J. F. Morse was called in to see the patient. He found him frantic and delirious with intermissions of comatous condition. He had a very profuse fetid discharge, no swelling of the mastoid region, but pressure upon the same would bring on the delirious spells. On the 28th I went with Dr. Morse to see the patient. We found him in bed, hardly conscious, and the least pressure upon the mastoid brought on the same delirious condition. The mother was advised to take the patient to the German Hospital for operation.

March 30th.—Operation: Ether narcosis; antiseptic precaution taken. The profuse discharges from the external meatus has ceased. In the mastoid region, about 2 *cm* from posterior insertion of the auricle, a cicatrix 5 *cm* long, in the centre of which was a navel-shaped depression extending into the bone. I made my incision as usual close to the posterior insertion of the auricle, but when I tried to detach the periosteum backwards, found the same firmly attached to the depression above described. After dividing these attachments I was able to force at this spot a probe into the bone and ascertain that there was a large cavity in the mastoid. This sinus was enlarged with chisels and hammer to the size of $11\frac{1}{2}$ *cm*, exposing a cavity filled with cheesy substance. Its contents were scooped out carefully, and thoroughly irrigated with carbolized water, which ran profusely from the meatus and also from the mastoid when irrigating into the meatus. The cavity was packed with iodoform gauze.

March 31st.—No fever. Patient slept well. His general condition is better; he is conscious. The dressing was partly removed, and the mastoid well irrigated with carbolized water.

April 5th.—He has been treated daily; his general condition improving from day to day. I found him reading the newspapers. After removing the gauze in mastoid I discovered some loose cholesteatomatous masses which I removed with the forceps. Dressed and bandaged as usual.

April 7th, A.M.—I found a younger brother taking care of the patient, who stated that patient was at times delirious. At present he is perfectly rational; no fever; wound in perfect condition. Same dressing.

April 8th.—Nothing abnormal; usual treatment.

April 9th.—I found patient delirious, in which condition he has been since 12 o'clock last night; he tore off the bandage,

and he speaks constantly in a confused way. When spoken to he answers and comprehends what is told him. I found nothing abnormal about the ear, and treated and dressed him in usual manner. Following the advice of Dr. C. M. Richter, who accidentally was present, I ordered one grain of opium every three hours.

April 10th.—He is still more irrational to-day; he does not answer any more when spoken to. He has taken one grain of opium every three hours, and has had an ice-cap on continually. No fever; pulse 75, small but regular. Dressed as usual, but with simple gauze, moistened in carbolized water.

April 11th.—The opium and ice have been continued; his condition is even worse. There is very little discharge from the meatus as well as from the mastoid. During irrigation, patient becomes unmanageable, and gradually recovers when it is discontinued.

April 12th.—He remains about in same condition; was worse for a short time, striking blows to the nurses and at the wall, and had to be isolated. Has been taking opium and bromide with iodide of potassium. He only recognises his mother. No fever. Bandage was kept on; very little suppuration; same dressing.

April 13th.—He has been more rational since the change of dressing yesterday. This morning though rational he is still very slow in giving answers; he also slept a part of the night. He sat on a chair to be treated. The mother, who is attending to him, states that patient complains of pain all over the body, and that he vomited yesterday afternoon and again early this morning. No fever; pulse 80. Discontinued opium; prescribed bromide and iodide of potassium, besides milk and beef-tea diet, six ounces of whiskey daily.

April 14th.—Patient feels very weak, but gives rational answers. After being dressed he was very anxious to get to bed, and slept.

April 15th.—He looks much refreshed; laughs and speaks to every one.

April 16th.—Same as yesterday, only that he complains about a little headache at forehead. Ordered ice-cap. There is very little discharge and very free communication. Same dressing.

April 17th.—He has slept well and wishes to leave the hospital.

April 18th.—About 10 A.M. he called at my office accompanied by his mother, who stated that at 1 A.M. and again at 6 A.M. her son had been flighty for a short time. He is now perfectly rational. There is moderate suppuration from the mastoid; communication very free.

April 19th.—A small polypus in upper and post. wall of external meatus, and two small granulations in the middle ear were cauterized with nitrate of silver. The opening in the mastoid is now closing rapidly; it still measures 3 *cm* including the soft external tissues. The bandage was dispensed with and a spring applied April 23d. The malleus was still present, and its handle is entirely denuded; it was removed with difficulty, and found disfigured and necrotic.

April 24th.—He had some pain during the night and felt very faint; he feels well this morning.

May 15th.—Has had daily treatment and has been wearing a rubber drain which was removed to-day, and a lead nail adapted. The discharge is very slight. He has gained flesh and now looks robust.

May 30th.—Nail reduced in size but not shortened. Daily treatment.

June 5th.—Fistula scraped with sharp scoop. During the entire months of June and July patient has had daily attendance; the communication has always been very free. Once each month the granulations in the mastoid were scooped out and repeatedly cauterized. During the months of August and September he was treated three times a week, and the mastoid scooped out once. During October a 2 per cent. solution of creolin was used for syringing, but without any benefit. It produced considerable smarting sensation, and the discharge became green. It was therefore abandoned and a solution of sublimate 1:1000 used instead. With the latter the discharge ceased entirely, November 3d, and the nail was left out November 17th. The fistulous opening was kept closed with a plug of cotton. There is now in the mastoid a cavity with smooth walls, with a small 3-to-4 *mm*-wide fistulous opening externally, in which November 14th a lead nail had to be applied again, it having contracted considerably when it was left out.

November, 1889.—During the past twelve months he has presented himself seven times. There has been no more discharge, he has worn the nail continually held in by a spring. The walls

of the middle ear and the cavity of the mastoid well lined with epidermis and dry. The external meatus is separated from the cavity in the mastoid by the posterior osseous wall or anterior surface of the mastoid. This partition is wedge-shaped, being wider externally (about 1 centimetre), gradually decreasing in thickness the nearer the middle ear. The aditus ad antrum was very much enlarged by caries of its exterior wall; thus a wide communication existed between the mastoid, cavum tympani, and external meatus. Under these circumstances I was convinced that the present condition was a permanent one, and decided, in order to get rid of the fistula in the mastoid, to remove the entire partition between the mastoid and external meatus, and thus obtained a larger cavity with one orifice, the natural orifice of the meatus.

Operation—February 13, 1890.—I made a semicircular section close to the posterior insertion of the auricle, detaching it entirely from the bone. With a periosteotome I detached the cutaneous post. lining of the external meatus from its osseous wall as far in as it reached. The auricle was then drawn forward by a strong sharp retractor I had constructed for this purpose, held by an assistant. I then chiselled away with gouge and mallet the wedge-shaped partition between mastoid and meatus as far as the middle ear. Though the hemorrhage was very slight, it still required very rapid sponging to ascertain the true condition of things in the depth, most of this work being done with Schwartze's gouge and mallet, and only small projections snipped off with my bone forceps. The cutaneous lining of the external meatus was then divided lengthways by a section in its posterior wall, extending from its attachment to the cartilage to its inner end. The cavity of the mastoid was well scraped with scoops. The auricle brought back to its insertion by uniting the wound with several sutures. The meatus was well irrigated, plugged with iodoform gauze to allow its cutaneous lining to spread, and antiseptic dressing applied. The necessary precautions had been taken in the room of the patient in case of delirium.

February 14th.—He received last night two grains of opium, he slept well, has no fever. As the bandage was impregnated with blood, it was removed and renewed.

February 15th.—No fever, but upon request received some chloral and bromide last night.

February 18th.—Leaves the hospital to be treated as out-door patient. There has been no reaction from the operation. There

is but little discharge, and is dressed daily as the pus accumulates in the mastoid.

February 28th.—He has been attended daily, irrigated with large quantities of carbolized water. The wound of the mastoid did not heal by first intention; the stitches had to be removed early to facilitate treatment. The discharge was for a few days comparatively profuse but decreased very rapidly. The meatus has widened very much, its cutaneous lining having spread and become attached to their respective sides. On the ridge left downwards of the osseous wall are some granulations, which, March 5th, had to be cauterized. During March patient has been treated at an average of twice a week, and is now, April 3d, in the following condition. The upper portion of the posterior wall was chiselled away, making it smooth with the roof of the defect in the mastoid, except at its inner end, where it forms a portion of the wall of the aditus ad antrum. The lower portion was not removed so well, and a portion of it being left, appears now as a low ridge dividing the meatus from the cavity in the mastoid in its entire length. Only a very small portion of the anterior wall of the aditus was removed, and this is now closed by a cicatricial band. Not only the meatus, but also the labyrinth surface of the middle ear, the ridge of the osseous portion of the meatus left as well as the cavity in the mastoid, are lined with epidermis. The wound on the mastoid is slightly drawn in but closed.

The result obtained is in my opinion a great one, so far as the fistulous opening on mastoid is done away with, there is no more need for a nail and spring, and the communication with the external meatus, such that no fear can ever be entertained as to the retention of macerated epidermis, or any other formation. This result of this operation probably differs from those performed by Küster, in the fact that the cavity in the mastoid remained almost as large after as before the removal of the osseous wall.

CASE 39.—**Chronic Bilateral Dry Catarrh of the Middle Ear with Thickening of the Membrana Tympani; Acute Catarrhal Inflammation of the Middle Ear Ending in Empyema Mastoidei; Operation; Cure in Four Weeks.**

Mrs. L. L. B.—, forty-eight years old, from Los Angeles, Cal., came under my care March 24, 1889, giving the following his-

tory. She is the mother of a large family and had always enjoyed the best of health until about two months ago when she contracted a severe cold. One week later her left ear began to pain, which lasted with short intermissions for about six weeks. At times the pain was very intense and accompanied by swelling behind the ear. She never had any discharge from the ear. Two physicians attended her; the first was discarded after he proposed an operation on the bone, the second treated her with insufflations of boracic powder. The last two weeks she has had no pain; her general health is poor; she feels debilitated, having lost considerable flesh; her complexion is at present of a dirty-brown-yellow (Mexican); the tongue is coated; has no appetite, and has no motion of the bowels.

Status Præsens: Externally nothing abnormal; regio mastoidea n. meatus normally wide; memb. tympani thickened and congested; hearing, $h = 0.1:5$. With catheter tuba found very free, no râles, followed by improvement of hearing $0.25:5$ and a lighter feeling of the head. R. memb. tympani thickened, $h = 0.2:5$, tuba free.

I then diagnosed the case as one of bilateral chronic dry catarrh with thickening of both memb. tympani, with acute relapse in left side extending into the antrum. I advised daily inflations and dry cotton bandage day and night.

April 2d.—Patient called at my office stating that she had been in bed attended by Dr. Rivas since she last saw me. The doctor was trying to improve her general condition thinking that then she would be better fitted to have the ear attended to. But her health has not improved, and she has had so much pain during the last two nights that she has not slept at all. On examination I found redness and swelling of the left mastoid region as well as sensitiveness on pressure. Ext. meatus and memb. tympani in same condition. I applied iodine to mastoid region and ordered continual application of ice-bag. In the afternoon I was sent for, the ice had been applied but, producing considerable pain, it had to be abandoned. Patient had slight fever. I applied a Priessnitz bandage.

April 3d., A.M.—Had pain during the night; the swelling of mastoid region has increased; it extends down into the neck, producing œdema. Priessnitz renewed, and informed patient that I would not postpone the operation later than the 4th in the afternoon. Consultation with Dr. Rivas. Same condition as in the morning, temperature 39.2°C ., anodyne, Priessnitz.

April 4th.—Bad night again with considerable pain, temp. 38.4° C., Priessnitz. At 4 P.M. operation, Drs. Rivas, Pinkerton, and Morse assisting.

Operation: Narcosis with Billroth's mixture. The usual shaving and antiseptic precautions taken, I made an incision close to the post. insertion of the auricle through the soft integuments, which were about one centimetre thick. This was accompanied by copious parenchymatous hemorrhage, which was stopped by compression and one ligature. The bone was denuded of periosteum, its surface rough. The linea temporalis and spina supra meatum not well defined, and no openings for the emissary veins visible. Thus the spot of selection for the operation was not characteristic. I began chiselling and had penetrated no deeper than 2 or 3 mm when pus made its appearance. With a steel director I then penetrated into a cavity of the bone and satisfied myself that we had before us a case of empyema of the mastoid. The external opening was enlarged with the chisel, until it measured 2 cm in vertical by one in horizontal direction. The pus oozed out as if it had been under pressure. The walls of the cavity, which was $2\frac{1}{2}$ cm deep, were lined with granulations and cheesy substance, which were scooped thoroughly. After irrigation with carbolized water, the cavity was packed with iodoform gauze and antiseptic dressing applied. At 8.30 P.M. temp. 38.4° C. Patient has taken some tea and feels well.

April 5th, 8.30 A.M.—Temp. 37.6° C.; had some sleep; her complexion has cleared so much that it was noticed by every one present; she stated that the heavy pressure in the head has disappeared, and that she only feels a little weak. The external dressing as well as a portion of the gauze in the mastoid were removed on account of being saturated with blood, and renewed. She asks to be allowed to sit in bed. Will take fluid food.

April 6th.—Slept during the night, no pain except stiffness of the neck. Temperature, A.M., 37.4° ; P.M., 37.6° . Dressed same as yesterday.

April 9th.—The temperature has never been any higher than 37.4° . The dressing has been renewed daily, the mastoid irrigated with carbolized water and packed with iodoform gauze. The wound begins to granulate. Patient has good appetite and will get up to-day.

April 16th.—She has been treated daily; the cavity in the mastoid is filling so rapidly that to-day I had to insert a conical lead nail, $2\frac{1}{2}$ cm long, held by a spring.

April 20th.—Daily attendance. Nail shortened $\frac{1}{2}$ cm.

April 23d.—After cauterizing fistula with pure nitrate of silver, shortened nail still more.

April 24th.—I left the nail out.

April 29th.—Wound in mastoid closed, protected by plaster.

May 1st.—Last night at 12 P.M. she had a chill and at 2 A.M. sent for Dr. Pinkerton.

May 2d.—Consultation with Dr. Pinkerton, who prescribed some quinine as no connection with the ear could be detected.

May 9th.—Patient was dismissed with hearing, $h = 0.75:5$. The cicatrix on mastoid still red, not painful to touch. Memb. tympani thickened and still slightly injected.

A great deal of details that are noted in my journal have been left out of this publication. I will only remark that this case was one of the so-called dry catarrh of both middle ears with thickening of both memb. tympani, which had been in existence for several if not many years. The cold contracted was accompanied by an acute catarrhal inflammation of the left middle ear and antrum. This process receded in the cavum tympani, but by some reason unknown to us became of purulent character in the antrum, destroying the bony cell walls and transforming the inner portion of the mastoid process into a cavity filled with pus and lined with granulations. If we accept the theory that there is no suppuration without infection with germs, we have to admit that the infection here proceeded from the middle ear through the tube, that at an early period the inflammation in the cavum tympani must also have been of purulent character but receded, and that the process in the mastoid only progressed because it had become incarcerated, all communication between cavum tympani and antrum being suspended. Similar cases of catarrhal inflammation of middle ear ending in empyema or central caries of the mastoid are very frequent (see cases Nos. 13 and 17 of these publications).

CASE 40.—Acute Purulent Inflammation of the Right Middle Ear; Caries Necrotica of Mastoid; Operation; No Communication; Cure in about Six Weeks.

C. F. H., male, thirty-nine years old, first came under my care April 10, 1888, and gave the following account of his trouble. During the night of March 8th his right ear began to discharge

bloody purulent matter ; this was accompanied by pain, which lasted during five days. The pain then began gradually to decrease and he went to work, but it has now increased so much that he is not able to sleep. The last two days he noticed a swelling of his neck below the ear.

Status Præsens : Profuse otorrhœa in right side, with swelling of the walls of the external meatus and swelling of mastoid region with œdema of the neck. Temperature 102° .

April 11th.—Temperature 100° .

Operation : Incision made in usual manner, soft tissues infiltrated, slight hemorrhage, periosteum partly detached from the bone, external plate slightly discolored. Spina supra meatum well developed, while the linea temporalis, as well as the emissary openings, are not well marked. The external plate, where the bone was most discolored, was only 1 mm thick, then came a layer of flat air-cells filled with pus. Under these cells the bone was again very hard to a depth of 2 cm, when the antrum was reached and found full of pus and granulations. These were scooped out, producing considerable hemorrhage, the total depth of the cavity in the bone measuring then 2.5 cm. After the patient had recovered from the narcosis a forced injection in the meatus was tried, but no communication obtained. The cavity was filled with iodoform gauze and antiseptic dressing applied.

April 12th.—Last night temperature 102.3° . The pain was very severe the first part of the night, but it then gradually decreased and he slept well the balance of the night. This morning he looks well, temperature 99° . There is almost no discharge from the meatus. The bandage, as well as the gauze in the meatus, was found impregnated with blood, which was still oozing through the same. A fresh dressing was applied, using some compression. Patient fainted during the dressing. In the evening temperature 100° .

April 13th.—He had no pain during the night and slept well. Temperature 99° . There is no discharge from the meatus. The gauze in the meatus was removed and a forced injection tried, but still no communication was obtained. The wound was well covered with iodoform, the cavity refilled with gauze, and dressed in usual manner.

April 17th.—He has been improving and attended daily. A portion of the external plate surrounding the orifice is very much discolored. No suppuration from the meatus and moder-

ate from the mastoid, which is now beginning to granulate. He leaves the hospital.

April 19th.—The granulations are growing so rapidly that a rubber drain-tube had to be inserted.

April 21st.—The portion of the bone which was discolored appears much healthier, and I applied two sutures in lower angle of the external wound to draw its edges together and thus protect the bone.

April 23d.—Roll bandage left off and dressing held by head-spring.

April 24th.—Removed sutures, granulations cauterized with nitrate of silver.

April 30th.—The drain-tube was exchanged for a conical lead nail 2 cm long.

May 5th.—Nail left out because it would not remain in position.

May 7th.—The posterior edge of bone at the external orifice in mastoid, being very sharp and discolored, was snipped with Luer's forceps and rounded off.

May 10th.—The granulations in mastoid very sluggish, bleeding easily; they were cauterized thoroughly and the lead nail re-inserted.

May 21st.—Nail again left out and granulations in bone well cauterized.

May 28th.—Only a fine probe can be introduced in the fistula, which is still $1\frac{1}{2}$ cm deep.

June 6th.—Wound perfectly healed. Memb. tympani thickened, slightly congested, hearing $h=0.5:5$.

The only difficulty experienced in the healing process of this case is that the periosteum had been separated from the bone to a greater extent than necessary. This was done because the bone was discolored, and I expected to have to remove some more of it at a later period. Besides, the edges of the orifice had been left very sharp, which is always an obstruction for the granulations from the soft integuments to extend into the cavity. Whenever we have a large cavity in the mastoid the sooner the granulations of the external soft parts (cutis and periosteum) extend into the same, the sooner consolidation takes place, by forming a dense cicatricial tissue, drawing in the cutis and periosteum. This will

naturally only then be the case when all the diseased bone has been removed from the mastoid process.

CASE 41.—Acute Purulent Inflammation of the Right Middle Ear Extending into the Mastoid; Operation; Communication; Cure in Seven Weeks.

Geo. W. Th——, male, thirty-five years old, I first saw in the German Hospital, April 18, 1888. He had been admitted April 16th, stating that three weeks previous he had measles; April 15th he had severe pain in the right ear and right side of the head, for which he used some drops prescribed by a physician. He had no discharge from the ear and no swelling of mastoid region. On admission the temperature was 101° . Warm fomentations and leeches were applied. During the night the ear discharged freely. April 17th and 18th the temperature was normal; the discharge from the ear and the pain have not changed. This condition lasted until the 23d of April when he was operated.

Operation: Incision 4–5 cm long, periosteum easily detached from the bone. The external plate showed about 1 cm behind the spina a bluish-gray discolored spot. Spina supra meatum well defined. The emissary canals not noticeable. At a depth of 3 mm I found several small cells containing pus; under these the bone was again hard, then still deeper a few more cells were found full of pus. I penetrated 2 cm deep, finding but small cells divided by heavy trabeculæ. A forced injection was tried the fluid passing freely from the meatus into the mastoid. All attempts to find a larger cavity or antrum failed. After syringing he was dressed as former cases.

April 24th.—As he complained of a great deal of soreness the resident physician gave him an opiate. Moderate purulent discharge from the meatus; the gauze in mastoid also impregnated with pus. To-day no communication obtained. Dressing renewed.

April 25th.—Same condition as yesterday. Temperature 100.2° . He still complains of more or less pain during the entire night.

April 26th.—Profuse discharge from mastoid, but very little from the meatus, otherwise same condition as yesterday.

April 27th.—For the first time he feels very well, having had but little pain during the night. There is almost no discharge from the meatus, but very copious from the mastoid.

May 2d.—April 27th in the afternoon he got up and walked in the garden. April 29th and 30th I was prevented from attending

the hospital and patient was dressed by the resident physician, who informed me that the suppuration had increased daily. To-day it is very profuse both from meatus and mastoid. There is no communication. Temperature 100.3° .

May 3d.—Temperature 101° . Same amount of discharge; considerable pain. Fearing retention of pus, probably because the antrum was not reached, I again scooped out the cavity thoroughly, penetrating a couple of millimetres deeper; the bone was very compact and the antrum was not found. By forced injection no communication was obtained. External meatus wide. Membrana tympani injected, with pulsating perforation in post. portion. Catheter introduced; tuba impermeable. Patient kept in bed. Antipyrin prescribed, fifteen grains three times a day.

May 7th.—Patient has been treated twice daily. He has had no fever and but little pain. To-day he looks better; the discharge is now decreasing, but still plentiful. Granulations are forming so rapidly that a drain-tube had to be introduced.

May 18th.—Hardly any change has occurred, the discharge remaining about the same. To-day the temple and right side of the face are swollen, to which ice was applied.

May 21st.—Swelling of face and temple receded. Ice discontinued. Discharge much less. The drain-tube was replaced by a conical lead nail.

May 29th.—Since the 21st the nail has been shortened twice. Moderate discharge. A polypus covering the memb. tympani was removed with cold snare. It originated in the middle ear and found its way outwards through the large perforation of the membrane.

May 30th.—The discharge has completely, and I may say suddenly, ceased.

May 31st.—Nail reduced again in size and length.

June 5th.—Nail shortened again and fistula scraped.

June 7th.—Fistula scraped again and nail left out.

June 15th.—Wound in mastoid completely closed. Memb. tympani slightly red and thickened; perforation closed; malleus not yet visible. With the catheter the air penetrates by strong pressure only. Hearing $h = 0.015$.

CASE 42.—Acute Purulent Inflammation of the Middle Ear; Imperfect Communication and Retention of Pus after the Operation; Cure in about Six Weeks.

J. I—, female in the thirties, consulted me May 1, 1888, and gave the following statement: Last January she had an earache

in the right side followed by discharge. Ever since the ear has been discharging, and the pain, which has never left entirely, has been very severe at intermissions. April 21st she had several spells of dizziness and was compelled to stay in bed. April 22d the pain was very severe and her family physician applied leeches to the mastoid region.

Status Præsens: The external meatus found full of greenish purulent discharge, macerated epidermis, and inspissated pus. The meatus very much constricted, its walls red and swollen, more so the nearer the fundus, thus preventing a good inspection of the membrana tympani. With the catheter the tuba was only permeable on strong pressure, followed by whistling sound accompanied by râles. Mastoid region not swollen, very sensitive on pressure at point of selection.

Treatment.—After cleansing the external meatus with carbolyzed water a Priessnitz bandage was applied.

May 2d.—She had a good night's rest, the first for two weeks. Same amount of discharge. Tube not permeable. Same treatment.

May 3d. Did not rest well during the night on account of pain. This morning the discharge was very much increased.

May 4th.—Patient had a good night. Same condition in the ear. Ordered repeated instillations of hot water every two hours.

May 30th.—She has been treated in the same manner: syringed with carbolyzed water, frequent instillations of hot water, Priessnitz at night, and inflations with catheter. Only at times the tube has been permeable to air by strong pressure. The discharge has been at times moderate, at times again very profuse. The pain has not changed in character, and she has frequent spells of dizziness. I repeatedly have advised her to submit to an operation, to which she only consented June 13th, when, besides aggravation of the symptoms already described, the external meatus was almost completely closed by swelling of its walls, and the mastoid region œdematous. Patient's general condition is very bad: she is emaciated, slightly icterical, the tongue coated, and has continually some elevation of temperature.

Operation: June 13th in the German Hospital. Ether narcosis. After shaving and disinfecting an incision was made parallel to insertion of auricle through the normal external tissues. Periosteum well adherent to the bone, the mastoid appendix of medium size, the place of selection very much depressed and discolored, the emissary vessels well marked, and the spina supra meatum well

developed. After chiselling through the external plate, which was 3 mm in thickness, pus appeared. An external opening was made of $1\frac{1}{2}$ by 2 cm, and then the contents of the mastoid, consisting of softened bone substance, inspissated pus, and granulations, was thoroughly scooped out to the healthy bone substance. It was then well irrigated with carbolized water, no communication having been obtained, the cavity filled with iodoform gauze and dressed antiseptically. At 7 p.m. temperature 100.1° .

June 14th.—Temperature 99.8° . She had much pain during the night, moderate purulent discharge from the meatus. The gauze in the mastoid was not disturbed. Syringed with carbolized water and dressed same as yesterday.

June 15th.—Last night temperature 100.9° . Patient states having had much pain during the night. There is now almost no discharge from the meatus but considerable from the mastoid. I removed all the gauze in the mastoid, syringed with carbolized solution, but no communication was obtained. Dressed in same manner.

June 16th.—Temperature 99° . She had no pain, but could not sleep during the night. Very little suppuration as well from the meatus as from the mastoid. Still no communication obtained in syringing. Same dressing.

June 17th.—Temperature 99.4° . Considerable pain during the night. Moderate discharge from meatus as well as from mastoid. Same treatment.

June 18th.—Temperature 98.6° . No pain. She insists upon leaving the hospital to-day. Profuse purulent discharge from the mastoid but scarcely any from the meatus.

June 19th.—Patient called at my office and stated that she had much pain during the night. The discharge from the mastoid is very copious and but very little from the meatus. I inserted a rubber drain in the mastoid and held it in position by packing iodoform gauze around it.

June 23d.—She has been attended daily, her condition not changing materially. The soft tissues of mastoid which were granulating very fast had to be cauterized repeatedly. The discharge has been moderate. The most distressing symptom is the almost constant dizziness. To-day I left out the rubber drain and replaced it by a conical lead nail $1\frac{1}{4}$ cm in length, held by a spring.

June 26th.—The insertion of the nail has had no effect upon

the discharge, which is still profuse. She still feels dizzy, but has no pain and sleeps well. On syringing the mastoid the fluid passed into the throat and through the external meatus, showing that communication was obtained. The external meatus is now more swollen than ever, its lumen slit-shaped. I concluded that there was retention of pus in the antrum or elsewhere, and left the nail out, cauterized the mastoid thoroughly with nitrate of silver, and dressed with iodoform gauze.

July 2d.—Has had daily attendance. On syringing the mastoid the fluid always passes into the throat, at times through the meatus. The discharge though moderate has decreased very much. Same treatment.

July 14th.—Patient states that after yesterday's treatment, which was the same as usual, she had very much pain and was in bed all day, having nausea but no vomiting. The discharge from mastoid as well as from the meatus has again increased.

July 15th.—Neither pain nor dizziness. Very little discharge. On syringing communication obtained. Swelling of external meatus very much reduced.

July 17th.—Left off bandage, replaced nail.

July 23d.—Still very little discharge. No pain or dizziness. Nail shortened and reduced.

July 27th.—Nail reduced again. Is treated every second day.

August 1st.—The nail fell out and was not replaced immediately, the fistula almost closed. The nail was left out.

August 4th.—Patient has not called for three days. I can still enter fistula with a probe to the depth of one centimetre. After washing with carbolyzed water it was covered with a piece of adhesive plaster. Still complains of dizziness.

August 8th.—The fistula entirely closed, the meatus almost normal, the membrana tympani thickened and injected, but no details in the same visible. Hearing $h=0. \frac{3}{8}$.

August 29th.—Patient called to see me. Her ear is in perfect condition, but she still complains of dizziness. Her general health has very much improved.

The treatment in this case can be subject to criticism because, though I was aware that there was all the time retention of pus, still very little was done to relieve the same. In the first place, when the patient first came, or at any time during the month of May, I should have tried either to

enlarge the already existing perforation, or, if this was not visible to make a paracentesis at any point of the membrana tympani still visible. This was delayed until the swelling of the walls of the meatus had completely closed its lumen and it was no more practicable. In the second place, it would then perhaps have been advisable to make several deep incisions in the walls of the meatus to reduce its swelling. I have never resorted to these incisions, because if made before opening the mastoid there is no need for them, as then the swelling in the meatus recedes very rapidly. The intermissions in the amount of discharge, which was one day very copious, to become scanty in a few hours and again very profuse, indicate that there was retention of pus. Whether the retention was only in the cavum tympani, or at the same time in some cavity of the bone which was not reached, perhaps the antrum itself, remains undecided. Unfortunately the depth of the cavity made by the operation was not measured, but I know that it exceeded two centimetres, and its walls were so smooth that it was then supposed that the antrum was included in the same. The continual dizziness may have been produced by the increased pressure on the stapes, by the retention of pus in the cavum tympani, but most likely by hyperæmia of the adjoining intracranial organs, as it lasted several weeks after the suppuration had ceased. During the treatment I made once an ophthalmoscopic examination and the fundi were found normal.

CASE 43.—Chronic Purulent Inflammation of the Left Middle Ear; Empyema of Mastoid; Operation; Communication; Considerable Improvement; Death from Typhoid Fever Nine Months Later.

James Mc——, sixteen years old, I first saw in consultation with Dr. H. W. Sawtelle, Surgeon of the U. S. Marine Hospital, July 13, 1888. The doctor kindly informed me that the boy came to see him Tuesday, the 3d, on account of otorrhœa in the left ear, which he had contracted two years previously and had entirely neglected. The 4th, he had severe earache, and became flighty, and has remained in that condition until the present time. I found the poorly nourished boy in half comatose state, from which he

could only be awakened by being loudly spoken to. There was no swelling on the mastoid, but intense pain upon pressure on the same, and profuse putrid discharge from the meatus, which was almost entirely closed from swelling of its walls. It was late in the afternoon, some miles distant from the city, and not being prepared, I decided to operate the following day.

Operation: Soft integuments normal, periosteum attached to the bone. Spina supra meatum well defined, external plate normal, very compact, the trabeculae very thick, the air-cells small. At a depth of 4 to 5 mm very fetid pus was found. The work of penetrating deeply and enlarging the small cavities containing the pus was exceedingly hard, on account of the hardness of the bone. This was, as usual, continued until a perfectly clean surface had been obtained in all directions. There is communication only when syringed into the meatus. Dressed with iodoform gauze and bandage.

July 17th.—He was dressed yesterday by Dr. Sawtelle. Temperature was 38° C. He feels much better, and has no more delirium, but still complains of some pain in the head. There is moderate discharge from the mastoid and slight from the meatus. Temperature 37.5° C. Syringed with carbolyzed water and dressed with iodoform gauze.

July 18th.—There is very little discharge from mastoid or meatus; the walls of the latter are very much swollen. No communication. Same treatment. He sleeps well and has no more pain.

July 19th.—Slight discharge from the mastoid, none from the meatus.

July 20th.—Moderate discharge from mastoid, none from the meatus.

July 21st.—Walls of meatus less swollen, considerable discharge from the mastoid.

July 22d.—Moderate discharge from mastoid, slight from meatus.

July 30th.—The intermissions in the amount of discharge which has occurred daily show in this, as in case No. 42, that there must be retention of pus. The external wound is granulating profusely; the granulations had to be clipped off with scissors to-day. Very free communication is obtained in syringing, and the discharge has decreased suddenly since the 27th.

August 1st.—As the discharge has not increased lately I inserted a nail.

August 2d.—Cauterized granulations in fistula.

August 3d.—Considerable discharge from fistula. There is still good communication. The cutaneous wound completely closed round the nail.

August 6th.—Good communication, the fluid passing clear when the head is held upright. Immediately afterwards the head was held perpendicular, and a large quantity of pus flowed out through the fistula. Probing carefully, I detected in the depth of the mastoid a second fistula running backwards and upwards leading to a cavity. This was separated from the cavity obtained in the operation by a thick osseous wall. I then tried to inject into the cavity with Hartmann's antrum canula, the fluid passing freely through the meatus and running into the throat. I enlarged the fistula in mastoid again and removed with sharp scoops all I could of the osseous bridge separating both cavities. This was accompanied by moderate discharge with well marked pulsations. The direction of the cavity found was so far back that I was convinced the internal lamella had already been perforated, and even that there was an abscess of the brain. The character of the hemorrhage and the exceedingly dark blood prevented me from interfering much more. After carefully syringing, a strip of iodoform gauze was introduced into the cavity and otherwise dressed as usual. The patient appeared to be in perfect condition, never complaining at all.

August 7th.—Syringed, obtaining communication. The discharge has decreased very much. Two drains were introduced, one in the fistula running forward, and the other in the second running backwards.

August 10th.—There has been no special change, except that the discharge has decreased very much.

August 13th.—Moderate very fetid discharge from the meatus. No communication in syringing.

August 14th.—There is considerable discharge from the meatus. On syringing through the mastoid, communication was again obtained, washing out some cheesy substance. Upon the slightest touch with the probe backwards, some hemorrhage follows. There was but little discharge through the meatus, and as the rubber drains would not remain in position, a lead nail was again applied.

August 26th.—He has had daily treatment, and for the last week communication has not been interrupted. The cavities filled with fungous granulations were scraped to-day.

August 29th.—Anterior cavity entirely closed : syringed through posterior cavity ; communication with the middle ear still exists. The latter was scraped, and the inner end of the nail bent to fit backwards into the same. This could only be done after again removing some of the osseous ridge with sharp scoops. The discharge is still moderate, as well from the mastoid as from the meatus.

September 27th.—He had been treated daily, the discharge gradually decreasing. To-day there is no more discharge from the meatus and very little from the mastoid. The nail was shortened to 2 cm and reduced in size.

October 3d.—The last few days there has been a little increase in the discharge, which is also fetid again. Having just received creolin, I used a freshly prepared two-per-cent. solution for syringing. It produced unpleasant smarting sensation. The cotton pellet in the meatus was also impregnated with this solution.

This treatment was continued daily until the 8th, when the discharge had decreased so much that the nail, which was still 1 cm long, was left out entirely. By the 12th the fistula had entirely closed and covered with a piece of plaster.

October 18th.—Has been treated daily in same manner. There is still slight greenish fetid discharge from the meatus.

November 12th.—About in same condition, with catheter rales in the middle ear ; slight fetid discharge. Prescribed a solution of corrosive sublimate (1:1000) to be instilled lukewarm into the ear twice daily. He will call twice a week at the office.

November 17th.—Very slight discharge, no odor.

He was treated four times in December, then once a week until April 18, 1889, when his visits ceased, his condition not having changed. His mother now states that on the 19th of April he came home complaining of headache and pain in his head. A physician who was called in diagnosed typhoid fever, and treated him for that until April 29th, when the boy died.

In this, as in the previous case, there was retention of pus. In performing the operation several small cavities filled with very fetid pus were found separated by thick trabeculae. Whether or not the antrum was open during the operation cannot be decided, the canal made having, through the very hard bone, followed the direction given by Schwartze. The cavity discovered later during the treat-

ment, and which seemed to have been the main seat of the disease, extended so far backwards and upwards that I at once suspected perforation of the inner plate and abscess of the brain. The very profuse hemorrhages of dark blood, with pulsations, cautioned me against too much probing in that direction.

I have since ascertained from the physician who attended, that the boy and two other members of the family died of typhoid fever within a short time. The doctor positively states that during his illness the boy never complained nor showed anything abnormal about the ear.

CASE 44.—Chronic Purulent Inflammation of both Middle Ears, Involving Both Mastoids; Spontaneous Perforation on Left Side; Operation; Subsequent Abscess on Right Side Two Years after Mastoid Operation; Complete Recovery in about Two and a Half Years.

Willie S—, male, five years old (this case figures as No. 28, Article III., these ARCHIVES, vol. xviii., No. 2, 1889), I found lying on the operating table in my office September 22, 1888, at 8:30 A.M., being cared for by his mother. He was unconscious, kept his eyes closed, and only reacted by screaming when touched about the head. He was very pale, emaciated, the skin very warm and dry. The temperature was not taken. The mother gave the following history: On the 24th of August the child came running into the house complaining that a boy threw a rock which struck him on the ear. This, however, was not the case; it was merely a way of expressing that he had pain in the ear. The two following days he went out to play, but towards evening he became very restless and he could not sleep at night. He was then confined to the house, would still play, but would suddenly complain of pain in the temple and lie down of his own accord. Every day he had some fever, and the discharge in the right ear almost ceased entirely. His general condition rapidly grew worse; he refused food, and lost flesh rapidly. September 7th the right ear began to discharge very freely, and he then rested better at night. About this time the mother noticed a swelling on the right mastoid region, which became larger every day to the present condition. Almost unconscious, he was wrapped in blankets laid on pillows to be taken here. They travelled several days, first forty miles in

a stage, then on a small steamboat, and at last with the train. During the journey the boy was expected to die at any moment, and was even given up by several physicians who saw him on the road.

I found a large abscess on the right mastoid region. I gave him a little ether and opened the abscess by a free incision, emptying about three tablespoonfuls of thick decomposed pus. I then syringed with carbolyzed water, which ran freely out of the meatus, applied a rubber drain and an antiseptic dressing. Being alone and afraid of the child dying in my office, I could not do any more.

September 23d.—I called at the house and found the child dressed lying on the sofa; a wonderful improvement has already taken place; his complexion is clearer; he asks for food, and slept well all night. I removed the dressing, syringed with a two-per-cent. solution of carbolic acid, and dressed as usual. This was continued daily until September 29th, when the communication which until now had been very free, stopped entirely. The wound in the mastoid has closed to the size of the drain, but the neck, as well as the occipital region, began to swell. The boy having gained sufficient strength, I sent him to the German Hospital for operation.

Operation: Dr. Morse assisting. Ether narcosis. A small polypus of the middle ear was first removed with the cold snare. The swelling on occipital region and neck very much increased. The side of the head was first shaved and thoroughly disinfected. The fistulous opening in the mastoid was enlarged upward and downward to a length of 4 to 5 *cm.* The soft integuments very much infiltrated, 2 *cm.* in thickness; between it and the bone an irregular layer of fungous granulations. The surface of the bone was rough, and in the same a fine fistulous opening existed 3 *cm.* from the posterior wall of the exterior meatus, and at the same height with it. The fistula was enlarged with gouge and mallet, the external plate being very thick and hard. The mastoid consisted of several medium-sized cells filled with pus, and divided by very thick and firm trabeculae. In the deeper portions a very thick layer of bone was found dividing the mastoid into two cavities, one backwards and one more forward in the direction of the antrum. No direct communication was detected between the two, and the partition had to be removed with the gouge and mallet very carefully to a depth of 2 *cm.* In syringing imperfect

communication existed. The mastoid was packed with iodoform gauze and dressed as usual. At 3:30 P.M. I found him sitting in bed playing, he did not know he had been operated, and complained about the doctor who put something to his nose. From now on he improved rapidly, was treated daily, and left the hospital on the 15th to be attended in my office as out-door patient. The communication soon became very free again.

October 15th.—The external wound was granulating so rapidly that a conical lead nail 2 cm in length had to be inserted. The swelling has disappeared completely.

October 22d.—The right ear has been treated daily in same manner. The left ear, which still discharges fetid greenish pus, has been syringed the last few days with creolin. A two-per-cent. solution produced considerable pain, the child crying long after he left the office; a one-per-cent. solution was then taken, having about the same effect, while the discharge neither decreased nor changed its character.

November 16th.—The nail was reduced in length, communication having ceased.

November 29th.—I again applied a longer nail, but it produced pain, and a few hours later it had to be replaced by one 1½ cm long.

December 25th.—No signs of granulations in the mastoid proper; the bone is still denuded as far as the probe reaches. It was therefore scooped out to-day with a sharp scoop. The discharge has gradually decreased; it is now very slight and has no offensive odor.

January 5, 1889.—Scooped out the mastoid again, removing some necrotic scales of bone. Leaving for Europe he was now left in charge of my assistant, Dr. E. S. Clark.

January 19th.—About in same condition. Leaves for his home to stay several weeks, the mother being well instructed as to the care needed.

February 15th.—Called again for treatment. The right ear shows no discharge, and free communication still exists. He was attended daily to March 4th.

April 4th.—He came again and was treated two weeks.

July 18th.—He was found in same condition and was treated daily until the 23d. On the 25th he was brought in, having a large abscess over the left mastoid region, which was opened, and fully two ounces of matter eliminated. He was syringed with car-

bolized water, a few strips of iodoform gauze were introduced in the cavity, and bandaged. Patient leaves to-day for Australia, and was therefore left to the mother's care. The right side still had a nail.

January 29, 1890.—The child was brought in again. The mother states that for two weeks after leaving here she poulticed the left side, which gradually healed up. On the right side the nail was still worn two months, and then left out because it could not be kept in place. The wound on this side also rapidly healed.

Status Præsens : Bilateral. External meatus normal, memb. tympani propria destroyed, memb. flaccida present, the handle of malleus shortened and adherent to the promontory. The mucous membrane of the middle ear covered with epidermis. Some depression on mastoid, with a linear scar; no pain upon pressure. In probing with a cotton-holder the cotton is slightly moistened, but there is no smell.

Practically the child is cured. The hearing could not be measured with accuracy, but he hears conversation better, and speaks now plainly enough to be understood by everybody, while before the mother was the only one who could guess what he said.

(To be Concluded.)

A CASE OF ORBITAL CELLULITIS AND PRIMARY
MASTOIDITIS INTERNA COMPLICATING INFLU-
ENZA ; OPENING OF MASTOID PROCESS ; RE-
COVERY.

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IN the following I beg leave to communicate an ocular and an aural complication of influenza, which, even if by too great a skepticism their connection with the latter should be doubted, are sufficiently interesting in themselves on account of their rather rare occurrence.

History: The patient, a girl of ten years, moderately well nourished, had as an infant blennorrhœa neonatorum. In December, 1888, I saw her first on account of adenoid vegetations in her naso-pharynx, which I removed with Gottstein's knife, and subsequent cauterizations with chromic acid, according to Hering's¹ method, with lasting good result. On March 28, 1891, I was called in consultation with Dr. L. Reinhard to see her at her residence for an inflammation of her left eye. Her family physician stated that she fell sick two days previously with the symptoms of influenza, especially severe headache and general nervous prostration.

Status Præsens: She is lying in bed. The left upper lid, in a state of ptosis, is hanging over the eye and cannot be raised to its normal position. It is slightly red and swollen. The palpebral conjunctiva shows only an inconsiderable increase of redness, no swelling, looks as if affected with a commencing catarrhal inflammation, and is partly covered with some threads of mucous discharge, which however is very scanty. The ocular conjunctiva is not chemotic, only somewhat hyperæmic. Cornea clear.

Pupil reacting to light perfectly well and equally with that of the other eye. But there is a moderate exophthalmus with displacement of the left eye downwards and towards the temple. The movements of the eye are impaired, especially inwards and upwards. When looking upwards and inwards, crossed diplopia sets in. Tension the same as in the healthy eye. Pressure on the globe is painful, but the finger cannot feel any hardness between the walls of the orbit and the bulbus. Especially at the upper temporal region no circumscribed swelling, so that an affection of the lachrymal gland can be excluded. V and field of V normal. The ophthalmoscopic examination reveals a normal disc, but a marked tortuosity of the retinal veins, which might have been taken for a sign of retinal congestion, had not the other eye exhibited the same appearance, which, as it has not changed until now—at the same time causing not the least functional trouble,—seems to be an individual peculiarity of vascular arrangement. The tongue is thickly coated and has a strawberry-like aspect, as seen in scarlet fever. Both tonsils are very much swollen and painful, but are not covered with pseudo-membranes. The skin of the whole body shows an erythema of a scarlatinous redness. No œdema. No albuminuria. The fever, which at first has been very high, is now moderate. I made the diagnosis *incipient orbital cellulitis*, and ordered iced applications, to be applied day and night. The next morning I found about the same condition. Under this rigorous antiphlogosis, which was carried out most faithfully, the inflammation gradually subsided, so that, when I was called again on April 3d, the swelling of the upper lid was diminished and the child could partly open her eye. There was hardly any discharge. Exophthalmus and displacement downwards and towards the temple, divergent strabismus in looking to the right, and difficulty and limitation in movement upwards and inwards, and diplopia persisted. The swelling of tonsils had decreased also. But another ailment had set in, a violent pain in left mastoid process, which was increased by the touch with the finger. The external meatus plugged by epidermic scales, so that *Mt* could not be seen. Ord. ice-bag on mastoid process, instillation of natr. carbon. into the meatus, and calomel internally.

April 4th.—Some of the impacted epidermis removed by syringing. Walls of the external meatus swollen, preventing a view at the *Mt*. The child could stand the ice-bag very well, which

relieved her greatly. The sensitiveness of the mastoid considerably diminished. She slept well. No headache.

April 5th.—The patient feels very much better. Mastoid process hardly painful any more upon pressure. Epidermic plates in meatus still, but no pus. Eye affection the same, though less in degree. Tonsils still swollen, the left side of the soft palate cannot be raised so well as the right side (Loewenstein¹¹ observed the same). Iced applications on eye and ice-bag on mastoid continued, and calomel. I did not visit the child any more until April 16th, since the pain had disappeared, and she felt so well that she could leave the bed. On April 16th I was sent for again, the pain in left mastoid process having begun anew the night before last. The day before she felt better, was out of bed, and played. But last night the pain became exceedingly severe, radiating over the neck, head, and left shoulder. Pressure on the mastoid is very painful. The walls of meatus swollen, but not red. *Mt* cannot be seen on account of the swelling and some remaining epidermic scales, which resisted all efforts of removing, the child being very nervous. But the auditory canal is perfectly dry, does not contain the least discharge. Exophthalmus gone, but still slight ptosis and crossed double images, when looking to the right and upwards. Pupils acting normally. Fundus, especially optic disc in both eyes normal, the retinal veins exhibiting the above-mentioned tortuosity. *V* not affected. Temperature slightly raised. Pulse rapid and small. Child is put to bed. Mastoid and neck brushed with tinct. iod., and ice-bag applied to mastoid. Internally calomel 0.30 dos. iii. Temperature at 5 P.M., 38.4° C.; at 8 P.M., 38.4° C.; *April 17th*, Temp. at 6 A.M., 36.10° C. She slept pretty well, but could not stand any more the pressure of the ice-bag. I ordered warm-water dressings and tinct. iodi applied twice a day. The integuments of mastoid presented not the least swelling or redness, so that there was no sign of a commencing periostitis externa. But the severe localized *pain*, the *fever*, and the *sickly appearance* of the patient, who looked rather pale, led me to believe, that there was an *acute mastoiditis interna* going on, and that the inflammation of the lining membrane of the mastoid cells might have turned into suppuration already, or at least was threatening to do so. Therefore I prepared the parents for an eventual opening of the mastoid process on the next day. Temp. at 8 P.M., 38° C. (in axilla).

April 18th.—The condition of the patient being the same as yesterday (temp. 38° at 6 A.M.), I thought it unsafe to wait any longer with the operation, for which I had everything ready. In chloroform-narcosis and under strictest aseptic and antiseptic precautions I made a large incision down to the bone. No ligatures were required. The periosteum and the external surface of the bone were healthy. The bone was opened with chisel and mallet. Corticalis pretty thick. When the antrum was reached the bone was chiselled off in such an extension, that an opening of a little more than 1 cm in diameter was obtained. The mastoid cells were found to be completely filled with red spongy fungoid granulation tissue, which was scraped off with Volkmann's sharp spoon. After thorough scraping and irrigation with sublimate solution 1 : 2000 a tampon of iodoform gauze with plenty of iodoform powder was introduced into the cavity and tightly packed. The external wound was not stitched. The meatus was also filled with iodoform gauze, and then a thick layer of iodoform gauze and carbolated absorbent cotton was fastened by sterilized bandages, encircling the head only, leaving the lower jaw free. The operation was performed at 8 A.M. Temperature at 6 P.M. normal. No pain. The child feels easy, sitting up in bed. The pain never returned after the operation, and the highest temperature was 37.5° C. The first change of dressing was made April 27th, on the 9th day after the operation. There was very little secretion in the iodoform gauze. No pain at all in the wound. Walls of the external meatus still swollen but not painful, and no discharge in its gauze. The swelling was gone at the next change of dressing, a week later. The dressing was renewed once a week until July 6th, when the very small tampon was left off. July 17th the wound was perfectly healed, exhibiting a depressed funnel-shaped scar. Hearing normal. *Mt* of normal appearance. Since the operation the child's general condition had improved wonderfully.

When I first saw the patient I had the impression that her disease was scarlet fever. The scarlatinous exanthema, the severe angina tonsillaris, the strawberry tongue, and the fever formed the well-known aspect of this disease. But the sudden attack of the previously healthy child, the rapid development of these symptoms with nervous prostration, and the subsidence of the exanthema after two

days, without desquamation later on, corroborated in my mind the diagnosis of the well-experienced family physician who had seen the sickness from the first day. *Exanthemata* in influenza, especially scarlatinous erythema, are described by a number of observers. Fraentzel² relates two cases of influenza in two children, which he at first took for scarlet fever, on account of the erythema, but found this diagnosis erroneous from the short duration of the redness and the absence of subsequent desquamation. Leyden,³ Ewald,⁴ P. Guttmann,⁵ Renvers,⁶ Riess,⁷ Schwimmer,⁸ Duflocq,⁹ report similar cases, and Antonin¹⁰ distinguishes a special form of influenza, which commences with an exanthema. *Pharyngitis* and *angina tonsillaris* are considered also as very often associated with influenza by Leyden, Renvers, Fraenkel,¹¹ Glower.¹² Loewenstein¹³ observed it in all his 78 cases of influenza from the very commencement. Since, from these considerations, there could be no doubt any more that we had a case of influenza, the next question arose, whether the affection of the left eye was in connection with the general disease. There being no local cause for the *orbital cellulitis*, I thought it to be of metastatic nature, induced by the general infection. It seemed to be analogous to orbital cellulitis or orbital phlegmon observed in other infectious diseases, as in glanders, anthrax, typhoid fever, variola, and scarlatina (Berlin,¹⁴ Schweigger¹⁵). In the last two years several observations of similar eye affections due to influenza have been published, wavering, however, between the diagnosis *orbital cellulitis* and *tenonitis*, so that it seems to me worth while to give this question some attention. *Tenonitis* was first described by O'Ferrall¹⁶ under the name "inflammatio tunicae vaginalis oculi," not based, however, on anatomical researches. He laid the chief stress on one symptom, the limitation of the inflammatory cedema to the tarsal portion of the upper lid. Berlin¹⁷ contends the pathognomonic value of this symptom, and is of opinion that the affection of Tenon's capsule is only a complication in some forms of phlegmon of the retrobulbar tissue, being only a portion of the latter. Schweigger¹⁸ thinks it to be very unlikely that an inflam-

matory process of well-marked symptoms should be confined exclusively to Tenon's capsule, without involving the orbital tissue. Linhart¹⁹ considers tenonitis only as a "supposed possibility." In opposition to that Mooren²⁰ characterizes tenonitis by the following symptoms: impaired mobility of the globe with slight protrusion of the eye and transparent chemosis. Hock²¹ describes a case of genuine tenonitis, based upon redness and chemosis of the ocular conjunctiva, lack of mobility in all directions, tearing pain, especially in movements, but the eye not protruded. He considers the latter symptom as the most important in retrolbulbar cellulitis. The clinical features of *orbital cellulitis* are: dull pain in forehead or orbit, inflammatory swelling of lids, especially the upper lid, swelling of the ocular conjunctiva, deficiency of mobility, either general or partial, exophthalmus, and diplopia. The lack of mobility and exophthalmus are caused either mechanically by the inflammatory effusion acting as a displacing foreign body, or by paralyzing the nerves and muscles through pressure. By some authors inflammatory and degenerative changes in the ocular muscles were observed (Schmidt-Rimpler,²² Leyden,²³ myopathia propagata, Friedberg²⁴). The superior rectus and the levator palpebræ superioris seem to show a predilection for the affection (according to Pagenstecher²⁵), causing ptosis and preventing rotation upwards. In the milder forms of orbital cellulitis authors concur in the *absence of chemosis*. If we consider now the recent observations of tenonitis and orbital cellulitis in consequence of influenza, so far as I have perused the incident literature, they come under the following headings: *Purulent Tenonitis*: one case of Fuchs²⁶ and one of Schapringner.²⁷ *Serous Tenonitis*: three cases of Fuchs and one of Greef.²⁸ *Orbital Cellulitis*: two cases of Pflüger,²⁹ one of Stoewer,³⁰ one of Valude,³¹ *with orbital abscess*: one case of Borthen,³² and one of Socor.³³ Fuchs as well as Greef, in their cases of serous tenonitis suspected at first incipient phlegmon of the orbital tissue, but corrected this assumption into the diagnosis tenonitis on account of the three following points: 1. The intense œdema of the conjunctiva (chemosis); 2.

The unusual limitation of mobility of the globe; 3. The moderate exophthalmus. Pflüger, however, thinks that the three cases of Fuchs, as well as his own two, are to be taken for cases of inflammatory œdema of the orbital structures, since in all the globe was displaced only in one direction, namely, forward and downward. He apparently thinks, and Stoewer and Borthen are of the same opinion, that in tenonitis the displacement is only forward, and the lack of mobility is general, not partial. He further says that the inflammatory œdema of the lids is a sign of orbital cellulitis, whereas Stoewer claims the absence of this phenomenon as confirming his diagnosis of retrobulbar effusion behind Tenon's capsule, excluding tenonitis. If we remember the anatomical relations of Tenon's capsule to the eyeball, nothing seems to be more natural but that one of the first symptoms of tenonitis, *i. e.*, an effusion between its parietal and visceral portions, must be chemosis of the ocular conjunctiva. The resistance there is much less—being only the loose, pliable, and easily movable conjunctiva—than at the posterior segment of the globe, where the whole eyeball would have to be pushed forward. The equal restraint of mobility in all directions, and the pain experienced in movement, are easily understood from the fact that all the ocular muscles are ensheathed by Tenon's capsule, and must naturally suffer from accumulations of inflammatory products in the capsule. In those cases described as tenonitis, in which the exophthalmus was more conspicuous, it seems to me more natural to assume a simultaneous inflammation of the retrobulbar tissue, which cannot expand except by protruding the eyeball, and therefore explaining, if circumscribed, the displacement not in the direction of the orbital axis, but forward and downward. In our case, however, as well as in those of Pflüger and Stoewer, the orbital cellulitis was not universal, but only confined to the upper portion of the orbit, affecting the upper branch of the oculomotor nerve by compression, and thus creating paresis of the levator and superior rectus, and the branch supplying the internal rectus. It was very mild, not implicating Tenon's capsule,

and therefore not producing chemosis, so that Tenon's capsule acted, as it were, as a barrier, preventing the effusion in the orbital tissue from finding its way into the capsule itself, and then beneath the ocular conjunctiva. It is not even necessary to assume an effusion; it might have been simply a hyperæmic condition of the retrobulbar tissues, as observed in other organs, being one of the characteristic effects of influenza.

The ear is the organ which has shown particularly well the tendency of influenza to lead to hyperæmia. Michael³⁴ has formulated the character of ear diseases in influenza in the following résumé: "The ear symptoms in influenza are objectively and subjectively the expression of an intense hyperæmia of the mucous membrane of the hearing organ." "Middle ear and mastoid process are enormously painful, because the swollen mucous membrane suffers from pressure. The products of inflammation, however, are absent, and with these the usual doughy swelling." "The hyperæmia is the indirect cause of the observed complications, leading to ruptures of blood-vessels, whose walls may be altered, and consequently to hemorrhages, and rendering the mucous membranes more susceptible for the invasion of infectious matter." Mostly all observers described as the most common ear complication in influenza, otitis media of great intensity and great pain, with tendency to hemorrhages. According to Schwabach,³⁵ the external ear participated more frequently than usual with intense inflammatory infiltration of the walls of meatus and extensive scaling of epidermis. Szenes³⁶ observed several times eczema of external meatus. In regard to affections of the mastoid, the observers are divided. Stimmel³⁷ never had to open the mastoid in his 100 cases of otitis media. Dreyfuss³⁸ found seldom the tendency to mastoiditis. Hoffmann³⁹ never observed it in 35 cases; Eitelberg⁴⁰ 1; Schwabach⁴¹ 2 in 100 cases of otitis media, of which only one was opened. On the other hand, Politzer,⁴² Gruber,⁴³ Ménière,⁴⁴ Szenes,⁴⁵ Chatelier,⁴⁶ noticed frequently the implication of the mastoid. Ludewig⁴⁷ saw repeatedly acute caries. Of Jansen's⁴⁸ 100 cases, the mastoid was affected in

57, in 25 chiselling, in 12 subdural abscess, with 2 deaths. Moeser⁴⁹ describes a case of *primary periostitis* of the mastoid due to influenza. In all these cases the mastoiditis was *secondary* to otitis media. Our case, however, is a case of *acute primary mastoiditis interna*. The accumulation of epidermic scales had nothing to do with the inflammation, and the swelling of the walls of the meatus was only a secondary affection to the inflammation of the mastoid. There was never any discharge from the ear, and from the very beginning the pain was confined to the mastoid spontaneously, and on pressure, without redness or swelling of the integuments. *Primary mastoiditis interna*, i. e., the primary inflammation of the lining membrane of the mastoid cells, without manifestations on the external surface of the bone or the periosteum, and without preceding otitis media, is a very rare disease (Schwartz,⁵⁰ Politzer,⁵¹ Fulton,⁵²). According to Politzer, it is due to the effects of colds, injury or syphilis. The chief symptom, on which the diagnosis rests, is the constant and *persistent pain* in the mastoid, radiating over the head, face, neck and shoulder, as very precisely described by Knapp.⁵³ If left to itself, there will be a very late appearance of inflammatory symptoms, as swelling and redness in the external parts. In our case the *pain* was very characteristic with *absence* of *external symptoms*, the *fever* and the influence on the *general condition* of the patient supporting the diagnosis very effectively. The intermission of pain of about ten days may be explained by the abatement of the hyperemia (under the very rigorous antiphlogosis), which, from the violent symptoms from the very beginning, must have set in very rapidly and very intensely. It returned when the inflammatory products, the fungoid vegetations of the degenerated mucous membrane had developed to such a degree that they filled the mastoid cells, obstructing the access to the tympanic cavity, and thus preventing a secondary inflammation of the latter. Or it may be interpreted by a re-invasion of the pathogenic poison of influenza, as some observers commented upon the relapses during the course of influenza. In otitis media due to influenza, the following micro-organisms have been found:

diplococcus pneumoniae (Fränkel-Weichselbaum), streptococcus pyogenes, staphylococcus pyogenes albus and strepto. pyog. alb. (Zaufal,⁵⁴ Finkler,⁵⁵ Scheibe,⁵⁶ Gradenigo⁵⁷). Fuchs found the diplococcus pneumoniae in purulent tenonitis, Socor diplo-, strepto-, staphylo-cocci in phlegmon of the retrobulbar tissue. This leads us to the question, whether the ear complications in influenza are a propagation of the inflammation of the pharynx and tonsils, or whether they are a localization of the influenza itself in the ear. In our case the latter seems to be the most probable, inasmuch as a transportation of the phlogogenic matter from the pharynx would have followed the anatomical paths and first affected the tympanic cavity instead of leaving it intact, invading only the mastoid cells. Besides that, the character of the hyperæmic condition, as found at the operation, would be in favor of a direct localization.

In regard to the treatment leeches (Michael, *l. c.*) are most recommended as best adapted to relieve such hyperæmic affections. The general condition of our patient, however, did not admit of such weakening measures, especially as in case of failure opening of the mastoid would have been resorted to. The affliction being an acute one, the pain alone would not have been a sufficient indication, as, according to Knapp (*l. c.*, p. 368), "the vast majority of cases of acute mastoiditis get well without an operation, when rest in bed and rigorous hygienic deportment are enforced." "Yet when the symptoms are alarming, and when in spite of strict treatment the headache does not abate, I think the opening of the mastoid indicated." Schwartz (*l. c.*) proposes the operation, if after eight days the antiphlogosis has not produced a decided improvement. In our case, the revival of the symptoms after an intermission of ten days, especially the fever and the impoverished condition of the child were sufficient proof that a further delay of the operation would have been deleterious to the patient. The possibility was that, our waiting for the development of empyema of the mastoid with more striking symptoms, might have exposed the patient to the dangers of pyæmia or meningitis, or to a secondary purulent otitis

media with perforation of *Mt.* and lingering course or, what in our case was not very likely, that by passing into a chronic mastoiditis interna it might have led to sclerosis of mastoid (as observed by Knapp, *l. c.*), causing great suffering to the patient, and necessitating, perhaps, a later operation under much more unfavorable circumstances. The condition of the mastoid cells found at the operation and the result proved, that in this case the operation was the only right proceeding. Our case, therefore, is a new addition to the series of those aurists who, under similar conditions, advocate an *early* operation. In regard to the technique of the operation and the treatment in this as in other cases, the strictest aseptic and antiseptic measures, with iodoform-gauze tamponade as drainage (no tubes, no plug of lead), have given excellent results.

To sum up, we have a case of influenza—its diagnosis based upon the sudden onset of symptoms with nervous prostration, exanthema, angina tonsillaris, pharyngitis—with orbital cellulitis and acute primary mastoiditis interna as a result of the tendency of influenza to cause hyperæmic, and further on inflammatory, conditions in different organs.

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SYMMETRICAL CONGENITAL DEFECTS IN THE ANTERIOR PILLARS OF THE FAUCES.

By MAX TOEPLITZ, NEW YORK.

(With one wood-cut.)

ON account of the scarcity of attractions of symmetrical congenital defects in the arcus palato-glossi, I feel justified in reporting such a case, together with an illustration.¹ It came under my observation in my service at the Ear and Throat Department of the New York Ophthalmic and Aural Institute.

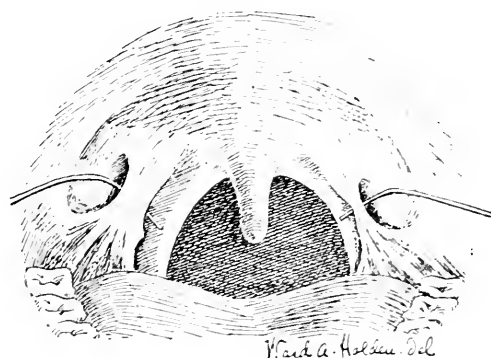
W. D., æt. twenty-three, parents living and healthy ; mother suffers from periodical attacks of asthma ; youngest sister, æt. twenty-one, consumptive. Our patient had measles when two years old, scarlatina and "pharyngeal croup" (Rachenbräune) when five, from which he suffered for an entire year ; at the same time bilateral otitis media and "cellulitis" on either side of the chest, which, when punctured, had discharged pus, subsequently also on irrigations. The cellulitis was of one month's duration. He had peritonitis when twelve years old.

The patient remembers the openings in his month back to an early date, and has been told of their very early existence by his parents ; his attention, however, has not been directed to it prior to the "diphtheria." He still suffers from continuous otorrhœa, and has been operated for nasal polypi and hypertrophy of the pharyngeal tonsil when fifteen years of age.

The examination reveals two symmetrical openings in the palato-glossal arches, the right one being slightly larger and somewhat more remote from the margin of the anterior pillar. Their margins are

¹ Dr. Ward A. Holden kindly made the excellent drawing, for which I am exceedingly indebted to him.

smooth without a trace of cicatrization. They are about $\frac{1}{2}$ " long, $\frac{3}{8}$ " wide, of elliptical shape, and end medially, as the probe indicates in the illustration, freely into the oral cavity, posteriorly blindly into the space, where the oral tonsils are usually located, the tonsils themselves being entirely absent. Below the right opening, more marked than below the left one, $\frac{1}{4}$ " from its margin there is a slight indication of what might be considered a radiated scar, but what resembles more radiated folds.



Small nasal polypi in the right nostril and a considerable perforation of the right membrana tympani complete the examination.

The literature contains not more than six similar observations, made by Wolters,¹ J. Solis Cohen,² Lefferts,³ O. Chiari,⁴ and Schapringer.⁵ J. H. Claiborne⁶ describes a hiatus in the anterior pillar of the right side only, whilst the defects of all the other observers are bilateral. Schapringer also mentions a one-sided defect in his paper, and I remember having observed one also some time ago.

¹ Wolters, Henle u. Pfeuffer's *Zeitschr. f. rat. Medic.*, dritte Reihe, Bd. vii., p. 156, 1859.

² J. Solis Cohen, *Medical Record*, July 20, 1878, p. 45; and "Diseases of the Throat," second edition, p. 206.

³ Lefferts, *Phila. Med. News*, January 7, 1882.

Another case, which was presented to Lefferts' class at the Coll. Phys. and Surgeons, N. Y., April 18, 1890, has been kindly communicated to me by the author, together with a third unpublished case with two *round* openings.

⁴ O. Chiari, *Monatschr. f. Ohrenheilk.*, etc., Jahrg. xviii., No. 8, August, 1884, p. 140.

⁵ A. Schapringer, *Monatschr. f. Ohrenheilk.*, etc., 1884, No. 11.

⁶ J. H. Claiborne, *Amer. Jour. Med. Sci.*, April, 1885, p. 497.

Schapringer's, as well as my patient, had undergone a severe attack of diphtheria in early childhood. Chiari's patient had suffered from sore-throat, whilst Claiborne's and Lefferts' cases had "never ulcerated sore-throat, never inconvenience." J. Solis Cohen does not mention any previous inflammatory condition in the history of his case.

Schapringer records a rudiment of the left and the absence of the right tonsil. Claiborne emphasizes the entire absence of either tonsil, and there is no trace of them in my patient.

At the Oct. meeting of the "German Physicians," held October 23, 1891, at Dr. A. Jacobi's house, where I presented this case for general discussion, no explanation for this condition could be offered. The opinion of all present concurred in its congenital nature, but whether it was due to arrested development (Chiari, Lefferts) or to separate investment of the muscle (J. Solis Cohen) could not be definitely settled.

In Schapringer's case a shallow furrow extended from either nostril to a short distance downward the upper lip without reaching the red mucous covering, the left being more marked than the right one, which he considers as indications of cleft palate, cured during intra-uterine life, an observation which confirms our opinion about the congenital character.

The location near the median line makes their connection with branchial fissures quite improbable. The bilateral occurrence of the openings favors the supposition of their congenital origin, whilst their appearance on one side only, and also the absence of the tonsils, which occurs frequently in adults, have no especial bearing upon their intra-uterine development.

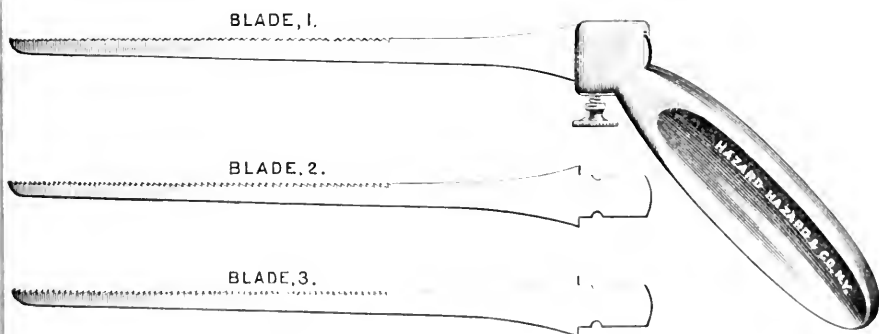
The knowledge of these defects is, at any rate, of practical import for the differential diagnosis of other affections.

A UNIVERSAL NASAL SAW.

BY DR. CHAS. A. BUCKLIN.

IN the *Medical Record* of October 24, 1891, Dr. Charles A. Bucklin, of New York, describes his universal nasal saw. In compliance with a suggestion of the author we publish the following abstract from his communication.

The handle is of sufficient size to give one a firm grasp, which is important when the bony deformity is large. Being of aluminium, it is aseptic and light, notwithstanding its size.



The instrument has three reversible blades, six inches long, containing three and one half inches of cutting teeth.

Each blade is designed to overcome special difficulties. They are not hampered by probe-points, and may be rapidly withdrawn and re-entered through the cuts they make when hemorrhage or a change of saw makes it desirable.

Blade No. 1, or the Bosworth saw, consists of perfectly cone-shaped teeth, thirty to the inch. It is made thin, and

binding is avoided by dividing the cutting power equally between both sides of the teeth.

Conditions are encountered where it is desirable to cut only as the saw advances. Blade No. 2 will meet these conditions. This blade would bind were it not for the fact that the teeth are thirty-two to the inch. They rake sufficiently forward to enable the finger to determine the "rake," as the teeth are drawn over it, while on the return stroke the release is complete.

This blade is very satisfactory for the following reasons:

1. With the head firmly placed against a head-rest, the most natural way to cut with a saw is toward the support.

2. In attempting to remove the inferior turbinated bone entire, the spring of its posterior end frequently causes other saws to bend sufficiently to defeat the operation, which difficulty is not experienced with Blade No. 2.

3. Deformities of the septum which terminate at their posterior end in a delicate ridge will readily catch on teeth which cut on the return, thus springing the septum toward the saw. When this accident occurs a single stroke may cut directly through the septum. These dangers are also obviated by Blade No. 2.

Exceptional conditions may arise where it is desirable to use a saw-blade which cuts on the return stroke.

Blade No. 3. This blade is less frequently useful than either of the others. It can only be used on the turbinated bones in rare cases where Blade No. 2, from some accidental peculiarity in the formation of the bone, cannot be used.

Reviews.

Handbook of Diseases of the Ear, for the Use of Students and Practitioners. By URBAN PRITCHARD, M.D., F.R.C.S., Prof. Aural Surgery, King's College, London. Second edition, with illustrations. London: H. K. Lewis, 1891.

We have perused with a keen interest this treatise of 238 small-octavo pages and gained the impression that it ranks among the first in the long list of small text-books on the ear. It is unexcelled in clearness and conciseness. The anatomical part, with its numerous and well designed wood-engravings, is masterly, as could be expected from the author's well-known original researches in the human and comparative anatomy of the hearing apparatus.

The chapter on the functions of the ear is short. The modes of examination and the description of the various kinds of aural disease in the following chapters are as clear a guide in the recognition and treatment of this group of affections as any practitioner could desire. The diseases of the nose and pharynx, so important in the management of aural disease, are fully treated of. The correct and easy style shows the hand of a master.

H K

The Anatomical and Histological Dissection of the Human Ear, in the Normal and Diseased Condition. By ADAM POLITZER, Prof. Otology in the Vienna University. Translated from the German by GEO. STONE. London: Baillière, Tindall, & Cox, 1892.

We have just received and warmly welcome the English version of this fundamental work of Politzer, which we reviewed and highly recommended when the German original appeared, about a year ago. If anything can stimulate and facilitate original research in this most difficult department, the normal and pathological

anatomy of the ear, it is this elaborate treatise ; illustrated by very numerous wood-engravings. Mr. G. Stone deserves great credit for having made accessible this much needed book to the English-speaking otologists.

H. K.

Diseases of the Nasal Organs and Naso-Pharynx. By WHITFIELD WARD, A.M., M.D. New York and London : G. P. Putnam's Sons, 1891.

This is a well written and nicely gotten up compendium of 165 small-octavo pages, with numerous cleanly executed engravings in the text. The subject is presented with clearness and precision, altogether from the practical standpoint. The book will be very useful to every one who wants to become familiar with this important, formerly greatly neglected, branch of medicine, and treat its diseases intelligently and effectively.

H. K.

The Throat and Nose and their Diseases. By LENNOX BROWNE, F.R.C.S. (Edin.) Third ed. London : Baillière, Tindall, & Cox. 1890.

The portion of this work which comes under our notice in this journal is that relating to the nasal passages and pharynx, and in the present edition these subjects have received an increased amount of attention at the hands of the author. In fact, he recognizes to the full the importance of a right understanding of these affections. In this work (setting aside the laryngeal portion) we have the following *seriatim* consideration of subjects. First, a sketch of the anatomy, followed by a description of the methods of examination and appearances seen. In separate chapters we then have a consideration of diseases of the pharynx, of the uvula, of the tonsils, diphtheria, lupus, diseases of the nose and naso-pharynx, and, lastly, two chapters devoted to aural maladies associated with naso-pharyngeal disease. In the paragraph on posterior rhinoscopy we are astonished to find no mention of palate-hooks ; an india-rubber band passed through the nose being the only means of drawing forward the palate referred to, as the author objects to "instrumental aids of complicated character." Needless to say to any one who has tried it, that a good palate-hook, such as White's, is of immense service. The figures of galvanic snares (p. 138) ; these instruments more clumsy, and thicker than there is any need for nowadays. The author's large experience of tonsillotomy leads him to say that very rarely is there a redevelopment of the hypertrophy, but as such a circumstance is not outside his experience, he always endeavors to remove as much of the gland as can be pressed into

the guillotine, and deprecates the removal of a "slice" only. In twenty years he has only known three cases in which bleeding has been serious, and only one in which it has been at all alarming. In view, however, of the possibility of accidents, he insists, when feasible, on the residence of out-patients, for a few days, in hospital, and of private patients within reach. Coming to nasal and naso-pharyngeal diseases, the author thinks that the importance of the pharyngeal bursa has been much exaggerated by Tornwaldt and Meers. There is an interesting and practical chapter on deviations and deformations of the septum. The author has given up treatment by cautery, incisions, and punches, and resorts to Curtis' trephines, and the nasal saw if necessary. He reports that he has obtained most gratifying results in over twenty cases from crushing dilatations with Hewetson's dilator. "The crushing of the turbinated bodies and bones and fracture of the outer wall, which must take place in some instances, appear to give rise to no troublesome symptoms." Septal displacement is also, it appears, sometimes an immediate result of forcible dilatation. This is to be straightened by the same instrument suitably modified by the author. Speaking of Woakes' necrosing ethmoiditis, the author mentions that in five years he has only seen two cases which could be described as caries of the ethmoid, which were not either syphilitic or malignant. He is therefore unable to confirm this author's observations. For the removal of nasal polypi he prefers the cold to the hot snare. On the subject of tapping the antrum the author says that failure to find pus as an *immediate* result of operation must not be too hastily accepted as evidence of erroneous diagnosis, as on more than one occasion a purulent discharge has been delayed for twelve or twenty-four hours after drilling. No reason for this is given. One of his patients cured himself of a chronic abscess in the antrum by inadvertently using a solution of chloride of zinc (40 grs. to the ounce). The chapters on the ear contain some elementary instructions on the examination and treatment of aural cases, with diagrams for clinical notes. A small pharmacopeia of formulæ completes the work. In regard to the illustrations, the colored plates at the end of the work (except possibly the one after Sappey of the lymphatics of the tongue, tonsils, etc.) are as in previous editions. The one illustrating the normal posterior rhinoscopic image is not very good, either as regards color or the delineation of the Eustachian orifices; and the wood-cut of the same image (p. 85) is also rough and imperfect. On the whole, the nasal and pharyngeal portion of this

work contains a great deal that is interesting, and, although we cannot agree with all the author's statements, we feel that he expresses his opinion candidly on the points raised, and by this means prevents the book from being a mere compilation, as is the case with so many text-books of the day.

A Treatise on the Diseases of the Nose and its Accessory Cavities. By GREVILLE MACDONALD, M.D. (London.) London : Alexander P. Watt, 1890.

This text-book forms a volume of some 360 pages, containing 60 illustrations, chiefly of instruments, but a few of histological character.

The first chapter details the author's experiments on the respiratory functions of the nose made on the lines of Aschenbrandt and of Bloch. The structure of the inferior turbinated body is next considered. In this connection the author says he has failed to find muscular fibres in the trabeculae of the turbinated bodies. Neither can he be sure of anything corresponding to the tunica albuginea of the corpora cavernosa. He contradicts Sajous' statement that the capillaries open directly into the venous sinuses. The hypertrophies and cedemas so commonly met with in the nose are accounted for by the author by the diminished air tension, due to the obstruction to the free access of air to the respiratory passages. Chapter II deals with the methods of examination and the symptomatology. In a description of the nasal contents as seen from the front, the tubercle of the septum is not mentioned by name. The use of palate-hooks is discountenanced (pp. 30-35), they being rarely considered of service. It is true, the author allows (p. 76) that exceptionally a palate-hook may be of some assistance, but the figure given of White's instrument conveys an erroneous idea of the shape of its sliding attachment. Acute rhinitis (catarrhal, dry, and membranous) forms the subject of the next chapter. In chronic swelling of the erectile tissue, where he has failed with the galvanic cautery, the author has seen benefit from procedures with a small tenotome. In Chapter V. the author enters at length into the pathology of mucous polypi arriving at the conclusion that they are but an ordinary inflammatory production peculiarly modified by the conditions in which they exist. He describes "ostitis granulosa" and "caries suppurativa" as occurring in the middle turbinated body. He insists on the obvious fact that "necrosing ethmoiditis" is always accompanied by

suppuration, in view of Woakes' statement that this disease is exceedingly common among patients who have none of the usual symptoms of diseased bone in the nose. Chapter VI. discusses the treatment and prognosis of these affections. Chapter VII. describes the practical aspect of mucous polypi, the use of the cold snare being advocated. We cannot agree with the author that Mackenzie's cog-wheel snare is the only possible instrument where it is necessary to hitch the noose over the polypus with the forefinger in the naso-pharynx. We have repeatedly operated in this manner with a more simple instrument. A long chapter (VIII.) is devoted to rhinitis sicca, and in it we find details of the author's method of treating ozæna, with which he claims to have effected great good. Details must be read in the original, but an essential fact is the physical method of augmenting the blood supply by artificially producing partial nasal obstruction. Chapters on affections of the accessory cavities and of the nasal septum follow. The remaining subjects treated at more or less length are nasal neuroses, post-nasal growths, tumors of the naso-pharynx, dyscrasiæ affecting the nose, epistaxis, etc. We are unable to follow the author in his explanation of asthma associated with nasal disease. For cauterizing the posterior wall of the naso-pharynx the author has invented a special guarded electrode, but when a palate-hook is used such an instrument is quite unnecessary. An appendix of thirty-three cases concludes the volume, some of considerable interest, *e. g.*, two of tubercular disease of the nose, one of fibrous tumor of the naso-pharynx and one of abscess of the sphenoidal sinus. A chromolithographic plate precedes the work, but the figure illustrative of what is seen by anterior rhinoscopy is imperfect, as it shows neither the tubercle of the septum nor the neck of the middle turbinated body. The views of the posterior nares in the other colored figures give a wrong impression of the Eustachian orifices, as with the mirror in the ordinary position the upper margin of the Eustachian cushion *appears*, owing to the necessary foreshortening, to be on a higher level than the upper margin of the choanæ. We have noticed a few misprints, such as "Zanfai," "Loschka," the statement that a piece of tubing measures ".008 m." in diameter, and the repeated use of the word "meati." Having thus drawn attention to some deficiencies we have noticed, we may say that the book is pleasantly and clearly written, gives evidence of considerable work, and contains many practical suggestions, the result of the author's own experience.

SOCIETY MEETINGS, ETC.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—At the meeting held on July 8th, Dr. Galland read a paper upon "The Function of the Tonsils." Dr. Galland had come to the conclusion that these bodies have no absorbent function, but were rather to be looked upon as protective, arresting and destroying micro-organisms on their way to the lungs and stomach. The power which the tonsils apparently possess of reproducing leucocytes is probably secondary to the before-mentioned destroying function.

ONTARIO MEDICAL ASSOCIATION.—At the eleventh annual meeting, held on June 3d and 4th, at Toronto, Dr. Reeve, of Toronto read a paper upon "Points of General Interest in Otology."

CAMBRIDGE MEDICAL SOCIETY.—At the meeting on July 10, 1891, Mr. T. Hyde Hill related the particulars of two cases in which he had used hypodermic injections of pilocarpin for the relief of deafness. A certain amount of temporary improvement was noted, but the patients quickly returned to their former state.

LIVERPOOL MEDICAL INSTITUTION.—At the meeting on October 20, 1891, Mr. Rushton Parker related two cases in which otitis media was followed by pyæmia, and in one of which he adopted, with considerable success, the plan of tying the internal jugular vein and scraping out the lateral sinus.

PATHOLOGICAL SOCIETY OF LONDON.—At the meeting on October 20, 1891, Dr. Hector Mackenzie brought forward a specimen which illustrated the association of myxœdema with general tubercular disease of the viscera. The larynx and fauces were particularly affected both with œdematous infiltration and tubercular ulceration.

It has been proposed to amalgamate the "Société française d'Otologie et de Laryngologie" with "The Société de Laryn-

gologie, d'Otologie et de Rhinologie de Paris," and a committee, including the presidents of the two societies, M. Rualt and M. Gellé was appointed to consider the matter. This committee presented its report in favor of the fusion, but the exact terms of the amalgamation have not been finally determined.

NATIONAL EYE AND EAR INFIRMARY, DUBLIN.—By the report recently issued it appears that during the past year 404 patients have been admitted as in-patients, and 2,460 treated in the out-patient department. At present there are thirty beds in this institution, and the committee are anxious to increase the accommodation, for which purpose a sum of £7,000 is deemed necessary. For some time past negotiations have been going on with the authorities of St. Mark's Ophthalmic Hospital with a view to amalgamating the two charities, but hitherto no satisfactory arrangement has been made. This failure is much to be regretted.

BRADFORD EYE AND EAR HOSPITAL.—The annual report of this institution for 1890 is to hand, from which it appears that 490 ear cases have been under treatment. Some details of the cases are given, and it is recorded that the mastoid antrum has been opened five times by means of Schwartz's chisel.

APPOINTMENTS.

Russell Coombe, M.A., F.R.C.S., has been appointed surgeon to the West of England Institution for Deaf and Dumb Children, Exeter, vice Torswill.

James Kerr Love, M.D., has been appointed Aural Surgeon to the Royal Infirmary, Glasgow.

T. Lyle, M.D., has been appointed pathologist to the Newcastle-on-Tyne Throat and Ear Hospital.

BEQUESTS AND DONATIONS.

By the will of Mr. Henry Solomons, who died on May 12th, the Jewish Deaf and Dumb Home has received a legacy of £100. Mr. Solomons was one of the oldest members of Lloyds.

By his will the late Mr. T. Aitken, of Fallowfield, near Manchester, has left £100 to the Manchester Institution for Diseases of the Ear.

The Deaf and Dumb Institution of Manchester has likewise benefited to the extent of £500 under the will of the late Mrs.

Jane Rogers, of Woodfield, near Ross, who died on January 9, 1891.

Mr. Henry A. Brassey, late of Preston Hall, Aylesford, Kent, has bequeathed a sum of £500 to the Central London Throat and Ear Hospital.

The very remarkable will of a very remarkable man has recently been proved in Australia and in London. The late Dr. Beaney served with distinction in the Crimea, settled subsequently in Melbourne, and held in rapid succession all the most important and honorable of the professional posts in that city. For some time prior to his death he resided in London. During his stirring career he had acquired a very large fortune, of which the greater part is disposed of by will to the various charitable institutions in Melbourne, London, and elsewhere. Among the many charities thus benefited may be mentioned the Victoria Eye and Ear hospital.

The contributions to the Liverpool Hospital Fund were considerable, and enabled the committee to distribute upwards of £10,000, the Ear and Eye Infirmary obtaining an award of £406.

By the will of the late Miss Hannah Pickard, of Ossett in Yorkshire, the Doncaster Deaf and Dumb Institution and the Leeds Institution for the Blind, Deaf, and Dumb, receive legacies of £1,000, and they also participate in the residual estate.

Hospital Sunday collections in the Protestant churches of the county of Dublin were made on November 8th. The amounts obtained are not yet to hand, but it is satisfactory to note that of the total sum of £69,486 odd received since 1874, the National Eye and Ear Hospital has been awarded £1,548.

MISCELLANEOUS.

Among the numerous addresses and congratulations presented to the veteran Professor Helmholtz on the occasion of his recent birthday celebration, was one from the principal and professors of Glasgow University, numerous other corporate bodies, institutions, and individuals, presented addresses eulogizing Professor Helmholtz' scientific labors, and referring especially to his work on sensations of tone and other points connected with the auditory apparatus and functions.

As aural surgeon to the Glasgow Institution for the Deaf and Dumb, Dr. I. K. Love, in the seventeenth annual report of that establishment, supplies us with much valuable statistical infor-

mation concerning the condition of the inmates. He finds, for instance, that of 122 children in no less than 36, or upwards of 29 per cent., the deafness can be traced to active suppuration, the presence of accumulations, foreign bodies, etc. It is needless to point out to otologists the importance of such observations as these, and it is to be hoped that other deaf and dumb institutions will follow the example of the Glasgow Asylum in retaining the services of competent aural surgeons.

In the *Lancet* of October 3, 1891, Dr. I. Ward Cousins figures and describes a new instrument for the removal of foreign bodies from the meatus. The apparatus is in the form of a pencil-holder with a double snare of fine wire. In skilled hands this may occasionally prove useful, but none of these instruments can supersede the syringe.

A curious case has recently been tried at South Shields. By order of the Board of Trade, the Local Marine Board of South Shields have held an inquiry as to the competence of a sea-captain, and eventually the certificate of the individual in question was suspended until he should have recovered from the deafness from which he was suffering. This is, we believe, the first time on record when defective hearing has been officially held to militate against the proper performance of a seaman's duties, although otologists have long been urging the importance of paying some attention to the subject.

In a somewhat similar connection a letter appears in the recent Students' Number of the *Lancet* (Sept. 5th), in which the writer points out to parents and guardians that it is unwise to encourage those who are unfortunately afflicted with certain physical defects to enter upon the study and practice of medicine. In the somewhat formidable list of such defects, which the writer considers to be more particularly prejudicial, is included "deafness, with or without purulent discharge." It cannot be denied of course that such conditions seriously handicap their possessors in professional work, but, on the other hand, it must not be forgotten that the same physical defects are open to objection in any walk of life. It is possibly riding our hobby-horse a little too hard to insist upon the absolute exclusion of all such unfortunates from our ranks, and, on the contrary, many notable exceptions might readily be pointed out, in which much more than the average measure of success has accrued, in spite of the deformities, etc., in question.

POST-GRADUATE COURSES.

LONDON.—The following lectures on otological subjects were delivered during the past session, viz.: On June 22d and 25th, "On Inflammation of the Middle Ear and its Complications," by Mr. W. Arbuthnot Lane. On June 25th, "On Mastoid Disease," by Mr. E. Woakes. On October 15th, "On the Examination of Ear Cases," by Mr. W. R. H. Stewart. On November 19th, on "Tinnitus Aurium," by Dr. Woakes.

The winter term commenced on October 12th and terminated on December 5th.

MANCHESTER.—Commencing on August 6th Dr. Milligan has been giving a series of six demonstrations at the Manchester Ear Institution.

EDINBURGH.—The lectures in connection with the post-graduate course in this city commenced on Monday, September 21st and continued until October 10th.

In a lecture on "Otorrhœa," delivered before the students of Charing Cross Hospital, and reported in the *Lancet* of July 25th, Mr. Marmaduke Sheild pointed out very clearly the dangers of permitting ear discharges to become chronic, and gave some practical hints as to the best methods of treatment.

ARCHIVES OF OTOTOLOGY.

LYMPHOMA OF THE TONSILS.

By E. CRESSWELL BABER, M.B., LOND.

SURGEON TO THE BRIGHTON AND SUSSEX THROAT AND EAR HOSPITAL.

THE rarity of this affection leads me to publish the following notes of a case recently under my care, although they are not as full as I could wish :

Matilda N., aged 14, a tall, thin child, was admitted an out-patient at the Throat and Ear Hospital on May 15, 1890, suffering from what appeared to be great hypertrophy of the tonsils, which was said to have existed for two years. They were both abscised with the guillotine and did not bleed much. Subsequently, one or two smaller pieces were removed (about July) from the right tonsil, one of which projected from the lower part of the tonsil, over the epiglottis. Before her admission she suffered from swellings in the groins. She remained away for some weeks, and returned on Nov. 24th, with the tonsils much enlarged again, the right one presenting an irregular surface, with ulceration on the right anterior pillar and adjacent part of the palate. Nov. 25th she was admitted as an in-patient, and portions of the growth in the right tonsil, which was the larger of the two, were removed with the guillotine, bistoury and snare on different occasions. Arsenic was also prescribed internally, and finally, as the breathing and deglutition were considerably impeded, especially by the lower portions of the growth, on Dec. 28th, under general anæsthesia I scraped out as much as possible of the right growth with a gland scoop, with considerable relief to the respiration and deglutition.

During my absence from home the patient then came under the care of my colleague, Dr. Scatliff, and for the following notes I am indebted to my friend, Mr. George Morgan.

"Feb. 5, 1891. Losing flesh rapidly. Glands on the right side of the neck are much larger, the size of a small orange. The inguinal glands are also much enlarged, though they vary in size

from time to time. Tumor of right tonsil now as large as ever. The left tonsil is also much enlarged, leaving only a narrow passage between the two. Enlarged glands in axilla.

"April 28th. Very emaciated. There is now a mass of glands on the right side of the jaw as large as a cricket ball. In each groin there is a mass even larger than that on the right side of the neck. The tonsils still keep enlarging. To-day Dr. Scatliff removed a large mass from each tonsil, partly with the guillotine, but principally by scraping with a curette. Last night, before the operation, the patient could only breathe in the erect posture. After operation breathing much freer.

"May 8th. Patient died of pneumonia. The day before death all the enlarged glands disappeared, the large mass in the axilla, groin, and neck all vanished, leaving the groins as flat as in the natural state."

There was no *post-mortem* examination. As regards the family history, it was stated that two sisters were in consumption, and that one had a running abscess in the neck with enlarged glands.

A microscopic examination of some portions removed during life from the tonsil was made by Dr. Chaffey, who reported as follows:

"Microscopic examination of a portion of the growth removed from the tonsil reveals a well-developed reticulum, somewhat delicate, and presenting a great number of endothelial plates. Numerous lymphoid cells, resembling white blood corpuscles are enclosed in its meshes. In some parts of the section these cells appear to predominate, together with a sprinkling of small round cells, whilst the amount of reticulum is relatively diminished. These appearances point to the growth being of the nature of a rapidly growing lymph-adenoma rather than lympho-sarcoma."

Remarks: The growths in the tonsils in this case, although they assumed such enormous proportions, were apparently only a local manifestation of a general disorder, such as lymph-adenoma, or possibly leukaemia. The blood was not examined.

Morell Mackenzie¹ records three cases of lymphoma of

¹ "Diseases of the Throat," German edition, vol. i., p. 108.

the tonsil occurring in men aged 57, 27, and 32 years respectively. In the first case the disease was bilateral, and the cervical glands were affected; in the others it was unilateral, and there is no mention of lymphatic glands being affected. The early implication of distant glands in the present case, as well as the bilateral character of the affection, pointing to a constitutional disorder, did not justify any attempt at a radical removal of the growth. The surgical treatment could, therefore, only be palliative to relieve the difficulty of breathing and deglutition.

ON THE STRUCTURE OF AURAL POLYPI.

By RICHARD LAKE, F.R.C.S., LONDON, ENG.

(With two figures.)

THE histological structure of aural polypi has been considered by aural surgeons to be one of considerable interest, but partly no doubt, on account of the less perfect methods of investigation at command, its study has not, until recently, led to any very definite results.

At the date of publication of Dr. Klingel's paper on this subject,¹ I was myself engaged in collecting material with the same object in view. The results I have arrived at are so very similar to those attained by Dr. Klingel, that for some purposes, especially as to the number and relative frequency of each variety, the two papers may be taken together, and the present communication used to confirm Dr. Klingel's (the first) results.

The most noticeable features of each report are the references made to the frequent appearance of myxomatous tissue, the origin of which is far from clear, though future careful investigation of the so-called "pedunculated structures"² may possibly decide this point. Another matter worthy of attention is the great similarity in the structure of aural polypi to scar tissue in various stages of growth, a similarity which, to a certain extent, bears out the theory advanced by some, that these tumors are usually exuberant granulations, due generally to caries of the subjacent bone.

The polypi were all from cases of middle-ear catarrh, with

¹ ARCHIVES OF OTOTOLOGY, vol. XX., No. 2, p. 142.

² Gruber, "Diseases of the Ear" (English translation), p. 78.

suppuration, except in one instance (a myxofibroma), in which there was a history of six months' deafness without discharge, following acute otitis media with perforation. In neither report are any malignant polypi included.

GRANULOMATA.

Four Cases. In only one of these was there any trace of a capsule; it was then seen to be formed of delicate fibres; in all vessels were numerous; in one true connective tissue was found in considerable quantity; in none was there any trace of epithelium.

FIBROMATA.

Soft or early fibromata—two cases. In one, cysts lined with epithelium were found; the epithelial covering in both was squamous and of some thickness.

Firm or older fibromata—two cases. One also was cystic; the other showed, in a well marked degree, ingrowing columns of epithelium; the epithelial investment was again squamous in both.



FIG. I.

Section of fibroma myxomatoides; shows the great depth of epithelium, with myxomatous tissue deep in the section and connective tissue, with some pure fibrous tissue between these two tissues. Zeiss E.

FIBROMA MYXOMATOIDES.

Nine cases. One a case in which the polypus had protruded from the meatus for fifteen years; the myxomatous tissue, if in quantity, was central, if in lesser quantity, frequently close to the surface. The fibrous tissue in these,

as in the fibromata, was often penniform or bi-penniform in longitudinal, and circular in transverse section, with generally a central vessel in early stages. Two of the cases contained large cysts without epithelial lining. In six squamous, in one cylindrical, and in two both varieties of epithelium were found.

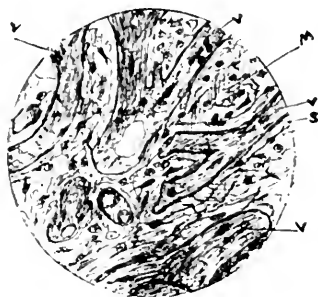


FIG. 2.

Section of angio-fibroma myxomatoides. The vessels (v) are mostly cut longitudinally. They are thin-walled, and show the perivascular lymphatic sheath (s) in places. (m) Myxomatous tissue. Zeiss E.

ANGIO-FIBROMA MYXOMATOIDES.

One case. The apex of the polypus was clothed with squamous epithelium, and contained all the three varieties of tissue, the angiomatous portion being one-sided, and the vessels separated by myxomatous formation; the base was without epithelium, and was composed of granulation tissue.

Remarks.—With regard to the epithelium. In one case of a recurrent growth (myxofibroma), which was sessile, and the total thickness of the growth not more than one fifth of an inch, the epithelium, which was squamous and very thick, showed, in an extremely beautiful manner, the prickles between the cells, thus demonstrating the fact, that polypi can have that variety of epithelium, whilst still practically in the cavity of the tympanum¹; the columns, which were making their way into the tumors, were in places of such thickness as to form "bird's-nest" arrangements of the cells.² The

¹ Weydner, *Zeitschrift für Ohrenheilk.*, xiv. Bd.

² Steudener and Kessel, *Arch. für Ohrenheilk.*, iv. Bd., 3 Heft.

degenerative changes undergone by these epithelial columns may possibly account for the formation of some of the cysts occasionally met with. Another method of cyst formation, seen in these tumors, is from mucoid degeneration of granulation tissue, and is most easily studied in fibromata. In these, the granulation tissue becomes included in a mesh-work of fibrous bands; these bands are formed around the vessels, the new tissue gradually constricting and compressing the older granulation tissue into more or less oval masses; these now undergo degenerative changes, the cells breaking down, and the intracellular substance becoming mucoid, and forming a series of small cysts, which become eventually one large one by the destruction of the septa.

In two tumors, one a granuloma, the other a fibromyxoma, true connective tissue, in considerable quantities, was found.

I did not observe any tendency to the formation of granulation tissue around the vessels, and in the angiomatous part there was none. In one case a hemorrhage, which was obviously recent, and probably due to injury just prior to removal, was seen.

Gland tissue,¹ though carefully sought for, was not discovered, but the cylindrical epithelium, when forming an ingrowth of a double row of cells, certainly had the appearance of a duct. Plasma cells were present in large numbers in the granulomata and myxofibromata, but not in the pure fibromata. The absence of epithelium outside, and of fibrous tissue inside, the granulomata, suggests the idea that these tissues appear at about the same period in the life history of the polypus.

These observations agree so closely with those of Dr. Klingel, that it is only where I thought I have differed from him, that I have offered any remarks, and I have adhered to his nomenclature throughout.

¹ Gruber, *loc. cit.*, p. 483.

ON THE SIGNIFICANCE OF THE ODOR OF THE
DISCHARGE IN THE TREATMENT OF CHRONIC
SUPPURATIVE OTITIS; WITH COMMENTS ON
TREATMENT.

BY DR. H. GRADLE, CHICAGO.

FOR a number of years it has been my habit to notice in every case of suppurative otitis whether the discharge had a fetid odor or not. I have thereby learned that, whenever pus from the middle ear has a fetid smell, the disappearance of that smell is the most sensitive criterion of the efficacy of the treatment. On the basis of about 600 observations I can formulate the following conclusions:

As long as the pus of otorrhœa smells fetid, the treatment employed has exerted no curative influence on the disease; and, conversely,

The first sign of curative influence of any treatment upon the course of an otorrhœa is its effect upon the odor of the discharge.

In order to test for the odor it is only necessary to mop out the meatus with cotton, and smell of the latter. If present, the characteristic fetid odor cannot fail to be recognized. Fresh pus never presents this smell. It may not be odorless; indeed, its smell probably varies with the kind of microbe causing the suppuration. But the characteristic fetor of decomposition is found only when pus has either been pent up at its source or stagnated in the meatus. Whenever we can succeed in thoroughly removing all stale pus, the discharge remains free from fetid odor as long as it does not stagnate again. As it is well known in general

surgery that the most favorable condition for the healing of any purulent inflammation is the free drainage of the pus, the significance of the odor of otorrhœa is evident.

My experience has led me to rely upon the odor when present in otorrhœa as a test of the efficacy of the treatment, according to the following plan. My first treatment in an uncomplicated case of chronic suppurative otitis usually consists in gentle, but thorough, syringing of the meatus, inflation through the Eustachian tube, and application of boracic acid powder. Whether this treatment has had a curative influence or not can be recognized the next or the following day with certainty, by the absence or the persistence of the odor. This, of course, is not the only sign of improvement. Indeed, it has not been a rare experience to find an uncomplicated case practically or nearly cured at the second examination. But no matter whether the subjective sensations or the quantity of the discharge show improvement or not, the removal of a previously existing fetor is always a positive indication of the curative influence of the treatment. If the odor has not been removed, the continuance of the same plan of treatment will prove of no benefit.

Of the therapeutic means mentioned, the removal of the stagnant pus by syringing is the one by which the odor has been abolished. If the mechanical cleansing has not been thoroughly done, the use of boracic acid or any other disinfectant in the meatus does not make the discharge odorless. Strong solutions of carbolic acid may mask the smell, but it returns as soon as the agent is no longer present. The efficacy of proper syringing, without other therapeutic measures, was shown in the following case :

A child of two years had had suppurative otitis for three weeks, and had been treated only with inefficient syringing on the part of the parents. After the cessation of the acute symptoms of the first few days there had been no further improvement. I was called hurriedly one evening when I had no instruments with me. The meatus was filled with fetid discharge. Unable to treat the child at the time, I used only the syringe on hand with tepid water, but *used it thoroughly*. On examination thirty-six hours

later I found a small perforation in the drumhead, but the discharge had ceased entirely since the proper cleansing, and there was, of course, no more odor.

It may be asked what part of the therapeutic result is to be attributed to the boracic acid? While many positive observations as well as an occasional failure by reason of insufficient thoroughness have shown me that the most important part of the treatment is the thorough removal of all stagnating decomposed pus, I have also learned by comparative trials that the time of treatment is materially shortened by the use of antiseptic powders. For between every two successive cleansings pus accumulates in the ear, and the microbes which it contains continue the formation of irritant products, unless their activity is checked by some antiseptic agent. Boracic acid, a feeble antiseptic, can do this only if present in excess. Its antiseptic efficiency and its curative influence are increased by the addition of salicylic acid (about one sixth). (Pure salicylic acid is unpleasantly irritating.) I have tested various other germicides in powder form and as fluids, but have found none superior and scarcely any as convenient as the mixture of boracic and salicylic acids.¹ The instillation of fluid antiseptics, like peroxide of hydrogen, which are not left in the ear permanently, have seemed to me to be in no way superior to mere thorough syringing with pure water.

If the odor is not removed by washing out the meatus, the disease cannot be cured unless other therapeutic means are employed. Sometimes retained pus can be removed by irrigation through the Eustachian tube. This is generally an easy procedure, if both ears are suppurating, in which case the Politzer bag can be used in the usual manner, but filled with warm salt water instead of air. It is more difficult and sometimes even impossible to wash out the tympanum through the Eustachian catheter. On the whole, however, instances in which retained pus can be removed from the tympanic cavity by a current of fluid forced through

¹ I have never met with any results confirming the fears expressed by Schwartz and Staake as to the possibility of damming up the pus by the use of dry powders, as long as these are blown in loosely without tight packing.

the Eustachian tube are not as common as those in which that object can be attained by syringing through a canula inserted into the middle ear. Hartmann's rubber canula is too thick for many cases. The most convenient I find to be the silver tube ordinarily made to fit the hypodermic syringe barrel. It can be used with greater steadiness, if attached to flexible tubing connected with an irrigator. Its use is not restricted to narrow perforations in the drum-head; but it may be of service whenever syringing of the meatus fails to deodorize. It is necessary to curve the tip and to turn it in different directions. Sometimes the purulent focus is in some recess between the ossicles and their ligaments. In such cases an immediate success of the syringing is shown by the appearance of cheesy fragments of pus or cholesteatomatous scales, and their removal checks further odor. If the intratympanic irrigation does not deodorize the discharge, it may be repeated a few times. But unless it ultimately succeeds in removing the smell it is of no further use and other means must be resorted to.

The decision as to what treatment to employ in the case of complications is also facilitated by observing the odor of the discharge. If polypi or granulation tissue dam up the pus mechanically, no treatment except their removal will deodorize the discharge or cure the disease. If, however, irrigation and antiseptic insufflations can render the pus odorless, small polypi and granulations may disappear without surgical treatment and a cure be effected. I can make this statement on the strength of a number of experiences in the cases of timid patients. Undoubtedly, however, the time of treatment is shortened by the removal of polypi and the curetting of granulations.

In the case of exostosis of the walls of the meatus, the surgical indication for their removal hinges on the impossibility to deodorize the pent-up discharge. As soon as the secretion has lost its fetor the otorrhea can be made to cease.

Carious bone is not an absolute obstacle to a cure of purulent otitis, if the discharge can drain freely, as shown by the absence of odor. But these cases require a long time. I have records of twelve instances in which exposed rough

bone could be felt by the probe in the walls of the meatus or tympanic cavity, or in the attic. After the discharge had been deodorized, the time of treatment varied between four and fifteen weeks, ending with permanent recovery. The bone was probably involved in many more instances, but the caries was either not detected or not sufficiently sought for. It is often difficult to remove the odor in otorrhœa with caries. This is probably due to the existence of crevices or recesses from which pus cannot drain freely. In some instances of caries I have made use of hydrochloric acid according to the suggestion of Ole Bull. A five per cent. solution of the concentrated acid was left in the ear fifteen minutes or as long as the patient could stand it. This was repeated at every visit, on perhaps three to six successive days, until the pus was free from odor. A number of times I have thus succeeded in doing away with the foul odor which had resisted intratympanic irrigation. After the discharge had become odorless I could not see any further benefit from the further use of hydrochloric acid.

In other instances, in which caries and stagnation of decomposed pus co-existed, I succeeded in reaching the seat of the disease by making use of the penetrating power of alcohol or alcohol and ether. By reason of their low surface-tension, these fluids can pass through clefts which water cannot enter. An alcoholic ethereal solution of iodoform (perhaps more active if containing salicylic acid), can thus penetrate into recesses filled with thick or cheesy pus. We thereby get the specific influence of the iodoform upon the infected tissue, while the coagulated secretion is washed out—either mechanically if the alcoholic solution is injected through the tympanic canula, or flooded out by the serous discharge which the irritant application produces. The pain can be controlled by the previous use of cocaine. After various trials I found that the deodorizing efficacy of the alcoholic ethereal iodoform solutions can be better relied upon, if the instillation is followed by filling the ear with antiseptic glycerine, which is then kept in by a tight plug of cotton. The glycerine may contain carbolic acid (ten to fifteen per

cent.) salicylic or boracic acids, or all three. It is probable that the increased efficacy is due to diffusion between the alcohol in the recess and the glycerine. Antiseptic glycerine solution alone without the previous alcohol or ether instillation cannot deodorize where thorough irrigation with water fails.

After the discharge from a carious ear has been deodorized it changes gradually from a relatively copious purulent to a scant serous secretion. It has seemed to me that this transition occurred more rapidly under the use of alcoholic ethereal solutions of iodoform, followed by the insufflation of dry powder, than when boracic (and salicylic) acid was used without the former. On the other hand, I have long ago learned that iodoform *powder* as such is absolutely inert in any kind of otorrhœa (except perhaps when there is a patch of granulation tissue). On the strength of my experience I would not consent to any resection of carious ossicles until both hydrochloric acid and iodoform solution followed by carbolated glycerine, had been thoroughly tried.

In the case of fistulæ situated in Shrapnell's membrane I have also found the odor — if present — a guide as to the efficacy of the treatment. The discharge in these cases is generally scanty and thin, and apt to dry into crusts covering the perforation. It is necessary to remove these crusts, if adherent, with a probe or dull curette in order to reach the seat of the disease. If necessary a fine canula must be introduced through the fistula and if this is not possible the opening must be enlarged. Even when we have succeeded in deodorizing the discharge, the progress of these cases is often slow, particularly if such crusts continue to form under treatment with dry powders. I have done better in some instances by keeping the ear filled with antiseptic glycerine. Alcoholic ethereal iodoform solutions are also of use in removing the odor in cases of this description, although I am in doubt whether the solvent without the iodoform would not answer as well.

If in any case of otorrhœa the fetor cannot be removed by these various procedures the source of suppuration has

not been reached and the disease will prove incurable, unless we resort to surgical interference. I have myself never seen an instance of caries of the ossicles which did not heal when the treatment as here described was thoroughly carried out, and hence feel disposed to question the indications for resection of the ossicles. But I do not consider my experience extensive enough to warrant me in generalizing on this subject. In every case of otorrhœa (5) in which I have failed after due efforts in deodorizing the discharge or benefiting the patient, the reason seemed to be involvement of the mastoid cells. I base this view on the copiousness of the discharge, and the apparent integrity of the tympanic walls and ossicles, although no external signs pointed to mastoid disease. While I have never had the opportunity to verify my diagnosis by an operation, the involvement of the mastoid cells without external signs has been definitely proven by Staake.¹ In thirty-three cases of incurable otorrhœa in which he performed his operation of resection of the external wall of the attic and ossicles, and opening of the mastoid cavity from the meatus, he found suppuration in the mastoid cells thirty times. He does not state whether the resected ossicles were found carious in all instances.

Is a cure possible in every case of otorrhœa in which the discharge is free from fetid odor,—in other words, in which there is free drainage of the pus as fast as it is formed? As far as those cases are concerned in which a fetid odor was present originally but was removed by treatment, my experience warrants me in saying, yes! But a minority of patients with otorrhœa never have any odor at all, and the prognosis of this group I would not state quite as definitely without some limitation. Whenever the pus remains free from odor, for the reason that it can drain freely and is so copious that it does not stagnate, ordinary treatment will cure the otorrhœa with certainty. But among the instances of odorless otorrhœa are cases of scant serous discharge coming from the attic through small openings in Shrapnell's

¹ Report of the otological section of the German congress of naturalists in 1891, in *Monatschrift f. Ohrenheilkde.*, No. 11, 1891.

membrane. These often require a long time before they can be cured and sometimes will not yield until the perforation has been enlarged and the curette been applied. Nitrate of silver has also proven of service in some such instances. Tuberculosis of the tympanic walls is also apt to yield an odorless discharge. From actual experience in one instance I do know that an otorrhœal discharge containing tubercle bacilli in a tuberculous subject can heal permanently. In most cases, however, the prognosis would be grave or questionable.

Finally I would emphasize the fact that there is a class of patients with purulent otitis, whose disease, while readily controlled, will relapse with such certainty that treatment limited to the ear alone is scarcely of any benefit. I refer to children with enlargement of the pharyngeal tonsil or chronic suppurative rhinitis, especially when complicated with nasal obstruction. In the former the otorrhœa can be cured, but it is almost sure to return. In the latter class of nasal cases it is often impossible to reach even a temporary cure of the otitis as long as the primary nasal disease continues. Under these circumstances a permanent cure can only be effected by supplementing the aural treatment with correction of the naso-pharyngeal anomalies.

ANTRECTOMY AS A TREATMENT FOR CHRONIC PURULENT OTITIS MEDIA.

BY W. ARBUTHNOT LANE, M.S., LONDON.

AS some considerable time has now elapsed since I first suggested and performed the operation which I call antrectomy for cases of chronic purulent middle-ear disease which did not yield to ordinary treatment, I feel that I should now make a general statement as to the subsequent career of these cases after operation, and as to the permanence of the very remarkable improvement in hearing capacity which followed within a very few days upon this treatment, and which was, in many cases, so complete as to defy the detection of any auditory imperfections by the lay observer.

By antrectomy I mean the obliteration of the antrum completely, or if that is impossible, owing to its having acquired considerable dimensions, sufficiently completely to prevent the formation of a cavity or sinus in the same position.

The details of this operation differ from those adopted by Schwartze of Halle, the pioneer in this section of aural surgery, who exposed the antrum through an aperture in the mastoid process, the diameter of which did not measure more than 15 *mm* across. From his description it seems to me that he merely opened and cleared out the antral cavity, and did not of necessity permanently obliterate it, performing an operation of antrotomy rather than antrectomy. Practically, however, antrectomy is but a modification of Schwartze's operation, to whom we are so greatly indebted

for an immense advance in aural surgery. Knapp, Gruber, McBride, and others have also done much excellent work in this direction with more or less success.

I would briefly remind the reader of the several points in reference to this operation to which I have directed attention in previous papers,¹ and some of which I believe are more or less original.

I attempted to demonstrate:

1. That the antrum plays a very much more important part in the pathology and causation of chronic purulent otitis media than is generally recognized. It steadily increases in size and becomes a progressively increasing obstacle to cure by simple methods.

2. That this cavity had only recently received from surgeons, anatomists, or physiologists the attention it deserves, being ignored by or unknown to some, while by others the term was applied to irregular cavities, the mastoid cells, in the substance of the mastoid portion of the temporal bone. In such a recent and elaborate work as Gruber's text-book on diseases of the ear, translated and edited by Messrs. Law and Jewell, I find that the antrum is figured and described as the orifice by means of which the mastoid cells communicate with the back part of the tympanum. No other allusion is made to this structure in the anatomical portion of this work, nor can I find any description of the manner in which the mastoid cells establish, during their development, this supposed communication with the middle ear.

3. That the antrum has no anatomical or physiological relationship with the mastoid process or its cells, but that it

¹ 1. "Five Complicated Cases of Middle-Ear Disease," *Trans. Clin. Soc.*, 1889.

2. "The Treatment of Suppurative Inflammation of the Mastoid Process Associated with Disease of the Middle Ear," *Brit. Med. Jour.*, March 20, 1890.

3. "Treatment of Chronic Otitis Media," *British Medical Association*, 1890.

4. "The Treatment of Pyæmia Consequent upon Disease of the Middle Ear and Unassociated with Thrombus of the Lateral Sinus," *Brit. Med. Jour.*, January 28, 1890.

5. "Abstract of Clinical Lectures on Inflammation of the Middle Ear and Its Complications," *Lancet*, September 26, 1891.

is situated in the petrous bone, and is physiologically and anatomically a part of the middle ear.

4. That the chief, if not the sole, function of the antrum is to secrete and store up mucus with which to lubricate and moisten the middle ear and its contents, in a manner analogous to the purposes served by the sacculus in the larynx. It varies somewhat in size in different subjects, but, as a rule, it measures about a quarter of an inch in length by an eighth of an inch in depth and breadth.

5. That a considerable number of mastoid processes consist throughout of very dense bone, or of bone containing but a few minute cancelli.

6. That a large number contain only in the apex of the process, and in its vicinity, cavities which vary in size from minute cancelli to cells of considerable size.

7. That in only a comparatively small number does the mastoid bone contain the two groups of large spaces or cells described by anatomists. It has been pointed out by other observers besides myself, that the older ideas as to the mastoid process being made up largely of cells, were absolutely fallacious; and that the presence of dense bone, free from any but the smallest cancelli, is not the result of chronic inflammatory changes—a mistake I have known made very frequently by surgeons. What I think is an anatomical or surgical fact of great importance is, that with chronic purulent otitis unassociated with attacks of tenderness and inflammation of the mastoid process (but accompanied by deep-seated pain in the same side of the head and perhaps also deep in the ear), in fact just such cases as I am calling attention to in this paper,—you are sure or almost sure to find the mastoid process nearly free from cells, and probably also from cancelli; indeed, it is usually composed of dense bone throughout.

8. That in the healthy subject the normal antrum may become continuous with the cells in the mastoid process, owing to their encroaching upon it in their subsequent development. This occasional occurrence accounts probably for the incorrect description of the anatomists.

9. That when a chronic purulent otitis media has existed

for some time, the antrum has increased in size, its cavity being filled with decomposing and irritating caseating secretion, which by its presence causes the progressive absorption and destruction of the wall of the cavity. In this way the dura mater of either fossa, with the lateral sinus, may be exposed, and form a portion of the boundary of the enlarged antral cavity.

10. That the antrum as it increases its area, encroaches more or less upon the mastoid bone, and may establish communication with the mastoid cells if they exist in a high degree of development, these also becoming filled with a material similar to that which is present in the antrum. If, however, the antrum before it had become inflamed were in communication with mastoid cells, the latter of course would participate simultaneously in the inflammatory process.

11. That if the antral cavity be much enlarged, it is perfectly hopeless to attempt with safety to clear it of its foul, tenacious, thick contents by any process of irrigation or operation through the external auditory meatus; and even if it were possible to do this it would be only a matter of a few days or weeks, before the antrum had again become choked with decomposing secretion.

12. That while the enlarged antrum is filled with its irritating contents, aerial conduction may be partly or completely absent, and that within a few days after the operation of antrectomy and cleansing the middle ear, though the patient may have been absolutely deaf in that ear for more than twenty years, ordinary conversation will be heard readily. In such a condition it is just a little difficult to understand by what means the presence of the caseating material in the middle ear and antrum is able to keep the hearing capacity of the internal ear in abeyance, so that within a few days after its removal the acuteness of hearing becomes as keen as ever. It is probable that it acts partly mechanically as a buffer to sounds, and partly by keeping up inflammatory irritation, much as the dry crusts sometimes do in ozæna.

13. That the facial nerve bears a very important relationship to the aperture by means of which the antrum commu-

nicates with the middle ear, since it lies immediately to its inner side, and that any uncertain interference with this aperture may result in permanent damage to the nerve.

14. That the chief function of the *membrana tympani* is to prevent too rapid evaporation of the secretions of the middle ear and antrum, and that its presence is not necessary in order to hear ordinary conversation with acuteness.

15. That after antrectomy, in order to retain the hearing capacity in the improved condition resulting from the operation, it is necessary to replace the functions of both the antrum and the *membrana tympani*. The former is done by daily irrigation, and by the introduction of a minute quantity of some antiseptic, as boro-glyceride, or a mixture of glycerine and iodoform, and evaporation is prevented by placing in the meatus a small plug of cotton-wool, or such a cap of compressed wool as that devised by Dr. Ward Cousins.

I have now performed antrectomy a very considerable number of times upon patients suffering from chronic purulent otitis media, and very often from pain, either more or less continuously, or at intervals, over the whole side of the head, or perhaps only over the mastoid process and above the ear; sometimes neuralgic in character, and at other times described as being boring, or throbbing, or like a deep-seated abscess, and very often preventing the patient from lying on that side of the head when in bed. In very many of these cases the patient did not complain of pain or tenderness when the mastoid process was forcibly compressed with the thumb or struck with a pleximeter.

In all or nearly all these cases the antrum was obviously very definitely enlarged—in most cases very considerably so—and, what is a matter of the greatest importance, the mastoid bone hardly ever contained any but the most minute cancellous spaces, but, on the other hand, it was often so dense as to take a good hour's hard work, or more, with gouges and a heavy mallet, to expose the antral cavity.

I am not, of course, considering the conditions that are so common in inflammation of and suppuration about the mastoid process. One has heard of mastoid cells distended with pus being readily opened by the use of even so clumsy and

unsuitable an instrument as the trephine, and then being cleared out with a sharp spoon; possibly, too, the antrum is also found and cleansed, especially if much enlarged, and if communicating with the cells by an aperture of any size.

It is at once obvious that the deep-seated and enlarged antrum, covered almost always in the cases I particularly wish to call attention to, by about three quarters of an inch or more of very dense bone, is infinitely more dangerous to the life of the individual than an antrum in immediate relationship, or in direct communication with large cells in the mastoid bone; since the latter, when inflamed, at once makes itself obvious to the most inexperienced surgeon, and even if he does not interfere, the pus usually escapes externally at last.

That the pain from which the patient with the enlarged antrum suffers is in most cases due to an obvious chronic inflammation of the dura mater in immediate relation with the antrum, I have been able to demonstrate on very many occasions.

By exposing the antrum in such cases, by the careful use of the mallet and gouges, and by scraping the cavity with sharp spoons, and then by subsequent removal of overhanging bone, so as to make the gouged inner wall of the antrum the floor or apex of a cone, the base of which is rendered as broad as possible, in order to remove the sides of the enlarged antral cavity, and by fixing for a considerable time a metal tube, in such a position that its end rests on the obliterated inner wall of the antrum, or, in other words on the apex of the cone, the cavity of the antrum is permanently obliterated, and the floor of the cone becomes filled up with fibrous tissue. The middle ear is then thoroughly cleared of its contents, any relic of the membrana tympani being carefully removed, and the aperture of communication with the antrum is enormously enlarged by the removal of its outer boundary (the whole of the posterior boundary of the external auditory meatus having been already excised when the mastoid process was cut away). In performing this last stage of the operation the greatest care must be taken to avoid any damage to the

facial nerve, and up to the present I have succeeded in doing this. On one occasion the muscles of the side of the face twitched violently, but no damage resulted. I may say that though it has never been my misfortune to damage this structure, it is, I believe, the chief—I may say the only—risk of the operation; yet it is one that would be most distressing to the patient, and should therefore always be in the mind of the surgeon as he is enlarging the aperture into the middle ear.

As regards the subsequent condition of the patient, months or years after the operation, when the simple daily routine of cleaning the ear and introducing a plug into the meatus is followed, the hearing capacity not only retains its improved condition, but often becomes more acute. If, however, the patient is dirty and careless, and pays no attention to the ear after he passes from observation, the hearing capacity gradually diminishes. My experience of the operation is that it is one of the most satisfactory and useful operations that we have in surgery. In skilful hands it is accompanied by practically no risk; it is followed by no pain worth talking of; it absolutely frees the patient from subsequent risk from intracranial complications, if the simple directions as to cleansing, etc., are followed; it removes the foul discharge; the neuralgic pain and tenderness disappear; it almost always cures any existing facial paralysis; it prevents the formation of aural polypi; and it gives the patient back almost perfect hearing, which remains in the same condition or improves, if he takes with it only such small trouble as the ordinary cleanly person habitually devotes to his teeth.

REPORT OF CASES OF DISEASE OF THE MASTOID PROCESS. WITH REMARKS.

BY THE LATE DR. HY. FERRER AND DR. E. S. CLARK,
OF SAN FRANCISCO, CAL.

(ARTICLE IV., concluded from page 75 of this volume.)

CASE 45.—Acute Purulent Inflammation of Left Middle Ear ; Empyema Mastoidei ; Operation ; Cure in Seven Weeks.

E. C. S——, male, forty-six years old. On the 7th of November, 1888, had pneumonia, accompanied by considerable pain over the left side of the head. On the 9th or 10th the left ear began to discharge ; after being poulticed for three or four days the discharge increased very much ; he could hardly sleep at night on account of pain in the ear. Has been treated by a specialist for the past three or four days.

Status præsens : External meatus filled with purulent discharge, mastoid region slightly swollen ; integuments red, sensitive to pressure ; walls of meatus almost normal, somewhat macerated ; *Mt* red and swollen, details not visible. Patient is very dizzy, cannot walk alone, has to be helped in and out of the carriage. Advised operation at once and sent patient to the German Hospital for that purpose.

December 7, 1888.—Operation : Ether narcosis. Had the temporal region thoroughly disinfected, cleaned, and shaved. Incision four to five *cm* long through the normal tissues. Periosteum easily detached from the bone and pushed aside. External surface of the bone normal in appearance, canals for emissary vessels well defined, also the spina supra meatum. In this spot I began to chisel and found the external plate 2 *mm* thick when smaller air-cells appeared. I then penetrated to a depth of 2 *cm* through a mastoid rich in small air-cells the trabeculae of which were

very firm. At the depth of $1\frac{1}{2}$ cm the sharp scoop was used and at 2 cm pus began to ooze out. I had so far made an opening in the bone of almost cylindrical shape and the walls of which felt perfectly hard.

No large cavity that would represent the antrum was met. A forced injection was then tried from the meatus showing that there was no clear communication, but thick pus was noticed to ooze out from the bone. I carefully probed with a steel director, but finding no communication with the cavity I used the sharp scoop until I had reached the depth of $2\frac{1}{2}$ cm. The walls being perfectly smooth and hard further interference was then dispensed with. The bone was packed with iodoform gauze, and the lower portion of the wound united with one ligature. Antiseptic dressing applied. Patient recovered immediately from the narcosis. No vomiting.

December 8th.—Had a splendid night without pain, his complexion wonderfully improved, bandage saturated with bright red blood, integuments of mastoid swollen, probably caused by the suture, the hemorrhage, which was severe during the operation, is from a small artery (auricularis post. sup.) which was not ligated. The gauze in the meatus dry but tinged with blood. No discharge. The gauze filling the mastoid was not disturbed. Syringed with carbolic solution and dressed in usual way. Temperature 99° .

December 9th.—Had a very good night, but towards morning some sharp pain in the ear which continued only a few minutes; bandage saturated with blood. The cotton pellet from the meatus perfectly dry. The gauze in the mastoid was removed, the opening syringed thoroughly with carbolized water, but no communication obtained. Will get up. Temperature 98.4° .

December 10th.—During the night he had at times a little pain in the ear; cotton in the meatus dry. Bandage still saturated with blood. The lips of the wound glued together to such an extent that they had to be separated with a probe in order to be able to syringe the fistula in the bone. After removing the gauze from the bone some pus escaped, opening thoroughly syringed with carbolized water, packed with iodoform gauze and bandaged. Was allowed to walk about in the house. Temperature 98.4° .

December 11th, 12th, and 13th.—Same condition and treatment. On 13th left the hospital and was treated in the office. No discharge in the meatus.

December 14th.—The lips of the external wound granulating, the gauze saturated with pus. In syringing, some muco-purulent

substance escapes from the bone. Last night was the best he has had for the last two months. After syringing, the bone was carefully probed but no sinuses detected. Usual bandage. No discharge from the meatus; *Mt* dull red and thickened.

December 19th.—Patient has been attended daily; occasionally complained of pain in temple; discharge from the bone mucopurulent. The external wound granulating nicely, was to-day thoroughly cauterized with nitrate of silver. There has been no discharge whatever from the meatus.

December 21st.—Rested well at night, though he had considerable pain after treatment yesterday, which continued until night. Prescribed antipyrin to be taken if pain should return. Discharge much less.

December 24th.—In syringing, patient felt fluid in throat; applied a larger drain tube.

December 27th.—Put in an aluminum nail 2 *cm* long. Same treatment.

January 8, 1889.—Daily treatment with but little change, granulations of bone exceedingly slow. Yesterday the nail was somewhat reduced in length and size. In syringing to-day the fluid was felt strongly in the throat. Applied a 12-per-cent. solution of nitrate of silver to the fistula. Nail now 18 *mm* long.

January 18th.—Has had daily treatment. To-day made nail smaller and shorter.

January 21st.—The nail, now 1½ *cm* in length, was left out. The fistula swabbed with a 5-per-cent. solution of carbolic acid and a strip of adhesive plaster placed over the opening.

January 25th.—Same treatment daily. The wound is now entirely closed. Dismissed.

CASE 46.—Acute Purulent Inflammation of Left Middle Ear, with Extensive Necrosis of Mastoid; Operation; Cure in Twenty Months.

A. B—, male, age thirty-eight, called at my office December 7, 1888, presenting the following history: On the 6th of November was taken with severe earache on left side; was treated with home remedies a few days, when the ear began to discharge, and has continued discharging ever since, with marked pain in the mastoid region, and at times in the ear and on the temple.

Status Præsens: In meatus profuse purulent discharge; mastoid integuments slightly swollen, sensitive to pressure; external meatus

somewhat narrowed by swelling of lower wall ; in osseous portion a polypus with smooth surface, bleeding easily ; applied several drops of cocaine in meatus, and after half an hour removed small polypus. Syringed with carbolic solution.

December 8th.—Had a better night, but awakened once or twice with some pain ; discharge the same ; granulations cauterized with nitrate of silver.

December 12th.—Has been treated daily by inflations with Politzer and syringing with sublimate 1:1000. The discharge was still as copious and purulent as at first. The osseous portion of the meatus was very much constricted, and bleeds easily. No view of the membrana tympani can be obtained. Sensitiveness of the mastoid very much diminished ; at times he has pain localized at the temple. At home he has been using instillations of hot water. By inflation the air passes freely. Ordered boracic-acid solution in alcohol to drop into the ear.

December 14th.—Discharge still about the same, amount profuse and entirely purulent ; no pain during the night ; has used the drops faithfully ; no pain on pressure on mastoid. Same treatment ; inner portion of meatus appears in same condition.

December 17th.—Same quantity of discharge ; meatus in same condition. Syringed with sublimate 1:1000.

December 21st.—Has been treated daily with inflations, at home boracic alcohol every two hours. Has been affected with dizziness the whole time ; much worse yesterday when I ordered leeches to the tragus. The discharge is thick, purulent, not very profuse ; has not changed by treatment ; the osseous portion of the meatus still constricted but somewhat less, and bleeds easily. With Politzer the air passes freely. Mastoid normal, not sensitive on pressure.

December 22d.—Dizziness greater to-day than before. Patient can now scarcely walk without swaying from side to side, and on rising from a chair almost falls over ; has nausea at the same time. Meatus in same condition. Temperature 100° .

December 26th.—Has had daily treatment, the dizziness steadily growing worse ; slight pain only on pressure on mastoid. An operation advised, and to-day this was performed at the German Hospital. Operation : Incision 4 to 5 *cm* long, parallel to insertion of auricle and 6 *mm* from it.

After penetrating with chisels $1\frac{1}{2}$ *cm* into the bone a quantity of pus escaped, then scoops were used and necrosed bone was

removed, making a cavity the size of a hazel-nut ; good communication was obtained, the fluid passing freely into the meatus on syringing through mastoid. Iodoform dressing, bandage. At 7 P.M. temperature 99.2° .

December 27th, 7 A.M.—Temperature 98.4° . Treatment by syringing with carbolic-acid solution and same dressing. Free communication with external meatus.

January 2, 1889.—Same treatment daily at hospital. Temperature normal after the first day ; left hospital, and will continue treatment at office.

January 7th.—Daily treatment at office, the wound gradually filling with healthy granulations ; to-day applied a lead nail $2\frac{1}{2}$ cm long held in place by a head spring.

February 15th.—The cavity is smooth and lined with a white membrane ; very little discharge ; no discharge from the ear. Scraped the fistula to promote granulation.

April 30th.—Has been attended daily ; the cavity scraped but without effect, finally cauterized with nitrate of silver, and after the third day there appeared granulations and the parts were more congested ; moderate discharge. The cavity, which was $2\frac{1}{2}$ cm deep, at that depth had turned forward for about $1\frac{1}{2}$ cm more ; now it is almost filled up to the nail. Patient feels better than at any time since the operation, and has no more dizzy spells.

May 2d.—For the last week there has been more discharge coming from above the point of the nail, where a new cavity seems to have formed. To-day considerable discharge, and patient complains of dizziness this morning, and especially on syringing. The mastoid region also swollen, and he complains of pain in the head.

May 17th.—The swelling of mastoid has subsided, and the patient has no more pain, but still considerable discharge ; syringed with carbolic solution and cauterized slightly ; a few granulations formed at bottom of cavity.

September 30th.—Has been treated daily, as above, but recently, when nitrate of silver is used, it is followed by dizziness, so discontinued its use entirely, and removed the granulations with a wire loop.

October 22d.—Complains of dizziness, general health very poor, low spirits ; slight discharge from the fistula, which is kept open by a thick conical nail 2 cm long. The fistula itself has smooth

walls and ends with a granulated surface. At the inner third of its upper wall there is a fistula into which a probe can be introduced in the direction upwards and forwards; here the bone is rough and denuded. I introduced a cotton pellet moistened with cocaine, and after a few minutes removed it and incised the entire upper wall from the fistulous opening to the external orifice, then with a small, sharp scoop bent at almost a right angle scraped the bone carefully from within outwards. This was followed by but little hemorrhage and no inconvenience to patient. After syringing with sublimate 1:2500 the nail was inserted and kept in with the head spring.

October 23d.—Still complains of dizziness; the fistula in mastoid syringed with a Hartmann canula, removing some caseous matter; nail, same bandage.

October 24th.—Same treatment as yesterday, less discharge in syringing. There is now better communication with the upper fistula, it being possible to enter and clean the same with the cotton-holder. There is but little discharge. Syringed with carbolic solution.

October 26th.—Changed the nail for a new one curving upwards. The sputum was examined and tubercle bacilli were found. Same treatment.

November 9th.—Had daily treatment; was advised to go to the country, and directions given to his wife as to treatment.

February 24, 1890.—General health improved very much, gained considerable flesh; very little discharge from the meatus, which presents a large conical fistula with external opening 9 mm in diameter. With a probe I forced my way upwards and inwards at innermost end of fistula and cauterized thoroughly with silver at end of probe. No discharge whatever from meatus. Felt very dizzy after the cauterization.

May 7th.—Was here twice in March. To-day in syringing mastoid fluid passes into throat.

June 9th.—Another operation advised to complete the closure of the wound.

June 11th.—*Operation:* A linear incision was made parallel to the insertion of the auricle above and below the fistula, then a horizontal incision connecting this with the external meatus; the external wound was then closed with sutures, and meatus packed with gauze, antiseptic dressing.

June 14th.—Have seen patient at house daily; very little dis-

charge. Treated by cleansing with carbolic-acid solution and iodoform dressing; will go to the country and his wife will continue the treatment.

August 20th.—Has had the wound dressed daily according to directions, coming to the office about once in two weeks; the wound now entirely closed; no discharge from ear. Hearing R h = $\frac{0.3}{3}$, V = $\frac{4}{10}$; L h = $\frac{0.0.2}{5}$, V = $\frac{3}{5}$. Dismissed cured.

CASE 47.—Chronic Purulent Inflammation of Left Middle Ear, with Abscess of the Mastoid; Three Operations; Patient Still under Treatment.

C. T—, male, age nine years, seen for the first time January 21, 1889. Had measles over six years ago; several months afterwards the left ear began to discharge, and has continued to do so, with intervals of being perfectly dry. The discharge was never copious, but always very offensive. About a year ago he complained, for the first time, of pain, but never since until last Friday, when he began to complain of pain behind the ear and on the neck when touched; even in eating he experienced pain.

The ear has been syringed by the mother; otherwise no treatment. R. S., accumulatio ceruminis; *Mt*, thickened; L. S., otorrhœa; meatus, normal; mastoid region, sensitive to touch, not swollen; membrana tympani, totally destroyed; in the left middle ear fine granular substance bleeding easily. Ordered the ear to be syringed three times daily with warm water and boracic alcohol.

January 29th.—Complains of intense pain over mastoid; discharge moderate.

February 1st.—Cotton in meatus saturated, and meatus filled with very fetid, cheesy matter. Advised an operation at once, and on consultation with Dr. Morse, operation agreed upon for to-morrow.

February 2d.—Operation by Dr. Morse in the German Hospital (Dr. Clark assisting). Incision about 4 to 5 cm long; periosteum pushed back, and chiselling began very close to the meatus. After penetrating the external plate and chiselling about 5 mm, cells were found filled with granulations. The opening was enlarged with scoop, and at $1\frac{1}{2}$ cm depth a cavity running backwards was found filled with fetid cheesy substance; this was scraped thoroughly, and, on syringing, the fluid passed freely from mastoid to the meatus. Iodoform dressing then applied; bandage.

February 3d.—Temperature 99.2° . Removed gauze from meatus, and syringed, but left mastoid not touched.

February 4th.—Dr. Morse dressed patient, and left him in the hands of Dr. Clark for future treatment.

February 5th.—Patient left hospital and came to office. The meatus still filled with fetid discharge, but not as offensive as before the operation; syringed with sublimate 1 : 1000, the fluid oozing through meatus. Same dressing.

February 6th.—Still purulent fetid discharge from meatus; no communication on syringing; applied rubber drain tube. Same dressing.

February 7th.—The fistula entirely closed at 1 cm depth, the rubber tube not penetrating sufficiently to keep it open. A lead nail, curved backwards and 2 cm long, was therefore applied after scraping out the granulations.

February 13th.—Same treatment daily, the granulations being scraped from the depths. The discharge is still fetid, but moderate in quantity.

February 17th.—Fistula scraped in the depths, and a nail $2\frac{1}{4}$ cm long, bent so as to fit closely, was inserted; communication obtained with middle ear.

February 18th.—Discharge much less, and without offensive odor; good communication.

March 11th.—Has had daily treatment in usual manner by syringing and occasionally scraping. The wound is now entirely healed, except the opening for nail; the latter has several times been replaced by a shorter one, followed the next day by closure and fetid discharge, making it necessary to reopen communication and apply a nail $2\frac{1}{4}$ cm in length. Now communication is very free, and discharge moderate, with no offensive odor.

March 22d.—Last night the nail came out. On probing found some rough bone at about 2 cm depth, and scraped slightly, removing a small piece of the bone.

April 9th.—Has had daily treatment. Three days ago put in a shorter nail to see if fistula would close. To-day no communication; no discharge from ear, but the cotton in meatus has a peculiar fetid odor; slight discharge in fistula, it also having closed in the depths.

May 7th.—Has been treated daily; the fistula was cauterized once or twice, and nail left out; now only a slight opening 1 cm deep, and covered daily with small piece of plaster. To-day a small amount of dry discharge in meatus.

June 9th.—No discharge.

June 11th.—Slight discharge from meatus; nail shortened to $1\frac{1}{4}$ cm.

June 18th.—Left out the nail.

June 25th.—Has been treated three times weekly; to-day goes to the country; gave the mother directions for the treatment while away.

September 9th.—For the past month has been coming once a week to office. There was very slight discharge, but this was fetid. To-day the discharge is increased, and also very offensive; syringed as usual, and advised to come daily.

October 1st.—Has had daily treatment by syringing. Now there is very little discharge, but it still has a bad odor.

November 16th.—Slight purulent discharge. No denuded bone can be felt with the probe.

December 14th.—Patient has been coming about once a week. To-day the mother states that on Thursday (12th) the mastoid region began to swell, and the boy complained of considerable pain at the same time. An operation was immediately made.

December 14th.—*Operation:* Ether being administered, an incision was made, emptying one teaspoonful of thick creamy pus. After careful syringing with carbolic acid, antiseptic dressing was applied. The patient rallied quickly, and was able to go home. He came daily to the office to have his ear syringed, and on the 18th of December was admitted and again operated on by me in the German Hospital.

December 18th.—*Operation:* After the usual antiseptic precautions had been taken and ether administered, an incision was made alongside of the old callus, down to the bone, the softened tissues pushed aside, and the bone carefully examined. It could be ascertained that the first operation was too superficial, restricted to the external layers of the bone, and directed towards the posterior wall of the meatus before having reached sufficient depth. Back of this defect in the bone was a small sinus, into which a fine probe could be introduced about 2 cm deep. The sinus was enlarged with mallet and chisel to the size of over $1\frac{1}{2}$ cm in circumference without interfering with the inner portions of the bone. This was filled with fungous granulations, which were scooped out thoroughly until the bone felt hard on all sides, and in the depth towards the middle ear I removed as much as I could. In syringing, very free communication was found to exist. Iodoform dressing. The boy was kept in the hospital three days,

during which^a period the bandage was changed twice, the first time only partially. During the second change there was already very slight communication.

January 16, 1890.—Has been dressed in office every other day ; there has never been much discharge from the wound, and in a few days a nail about $1\frac{1}{2}$ cm long was applied. This has been shortened and reduced twice. Communication soon stopped entirely. There is but slight discharge from the meatus, but it still has a very fetid offensive odor.

February 24th.—Fistula in inner part closed ; opened with probe and cauterized. Comes to the office once in two weeks.

May 7th.—Calls about every third week. To-day in syringing the mastoid the fluid passes into the throat.

July 14th.—Fistula now entirely closed ; left off the spring ; very slight discharge in meatus.

[April 8, 1891.—Has been treated at home for the past nine months. States that there has been slight discharge all the time, and occasionally it has a bad odor. Now slight fetid purulent discharge from meatus ; cleansed with sol. bichlorid. of mercury, and after drying applied powdered aristol.

April 13th.—Has been treated daily in same manner ; discharge materially decreased, and no fetor whatever.

May 20th.—No discharge for several weeks past. Dismissed cured.

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CASE 48.—Chronic Otorrhœa of Left Side with Abscess of Mastoid ; Operation ; Cure in Four Months.

Miss C. F——, age about twenty-five years. On May 10, 1889, was called to the patient's house, found her in bed, and made the following statement : Had otorrhœa when a child (left side), was treated at time ; polypus removed from ear and discharge ceased. was not troubled again until several months ago, when discharge reappeared. Has had no treatment. Now suffers intense pain.

Status præsens : The whole mastoid and temporal regions very much swollen ; some purulent fetid discharge from ear ; the external meatus, however, completely closed by large polypus. Advised an immediate operation to open abscess over mastoid.

May 11th.—Called in Dr. Morse, who, with Dr. Lovelace to give the anæsthetic, opened the abscess and evacuated about eight

ounces of pus. Just preceding that I removed the large polypus from meatus. Filled the cavity with gauze and bandaged.

May 12th.—Removed bandage and syringed with carbolic-acid solution. On syringing the ear large quantities of fetid pus and macerated epidermis came out. On the posterior wall of the meatus was a small opening from which oozed considerable pus, it was in this point that the polypus originated. Patient felt dizzy, and therefore postponed further syringing until to-morrow. Same dressing.

May 13th.—Swelling considerably less; patient much better; more fetid pus and epidermis obtained in syringing, but patient becoming dizzy did not syringe thoroughly. Same dressing.

May 29th.—Has been treated daily at house, the wound gradually closing up until a few days ago a rubber tube was applied to keep it open. There is now a small spot where the bone is denuded of periosteum; to-day applied a nail, keeping it in place with adhesive plaster.

June 4th.—Has been coming to office daily. Same treatment.

August 15th.—Has had daily treatment. About June 15th the discharge from meatus ceased entirely, and the latter now shows a large cavity in its upper posterior portion. The external opening closed about the same time, but the day following there was an accumulation of pus, so it was opened again. Since then it has been gradually filling up until now it is about 2 cm deep. Slight discharge daily, is kept open by a nail.

September 13th.—The nail has been gradually shortened. Now it is 1 cm long, no discharge. To-day left out nail.

September 17th.—Wound closed entirely.

October 9th.—R. h. = $\frac{2}{3}$, L. = $\frac{3}{4}$. Dismissed.

CASE 49.—Acute Purulent Inflammation of Left Middle Ear; Empyema Mastoidei (?); Operation; Cure in Five Weeks.

Mrs. C. H——, age about fifty. Called at office September 27, 1889, complaining of pain and discharge from left ear for about six weeks. Has been treated at St. Mary's Hospital for one month. Only occasionally syringed. No relief.

Status Præsens: Left meatus swollen; very sensitive to touch; considerable muco-purulent discharge. The mastoid region somewhat swollen and denuded of epidermis from application of a blister. Complains of pain and dizziness.

Syringed with carbolic-acid solution, applied zinc oxide plaster to denuded surface, and bandaged.

September 29th.—Same treatment yesterday and to-day, not so much pain, but discharge continues profuse.

September 30th.—Complains of dizziness and considerable more pain in mastoid region, the same being swollen and very sensitive to touch. Same treatment. Applied Priessnitz bandage, and advised patient to go to the German Hospital for treatment.

October 1st.—Patient was so weak that she could hardly come to the office, though ear and mastoid appear the same as yesterday; discharge the same; will go to the hospital to-day.

October 2d.—Dr. Morse was asked to see patient this morning, after examination he advised immediate operation; this was performed in the afternoon by Dr. Morse, who attended patient until October 23d when I took charge of the case.

There was no discharge from the meatus. On mastoid region a large raw surface covered with fungous granulations and producing considerable discharge. This I at once cauterized thoroughly with nitrate of silver. The following day I was astonished to find the patient report that until yesterday she had had continuous pain on that side of the head, which had left her a couple hours after my first treatment. I kept her in the hospital a couple of days longer, cauterizing daily. The granulations receded as well as the discharge, and she was treated as an out-door patient. A short nail was inserted and kept in place for a few days, and when removed the sinus closed at once by contraction of the tissues.

November 5th.—The patient was discharged cured.

CASE 50.—Deaf and Dumb from Chronic Bilateral Otorrhœa with Caries of Mastoid, Right Side; Operation; Fistula Still Open when Last Heard from.

R. C.—, female, aged fifteen. Physically well developed child. Has been in the institute several years, being deaf and dumb. When three years old had scarlet fever; shortly afterward earache with discharge. Abscess behind right ear. She was then treated and operated on by Dr. Barkan, who removed a piece of loose bone.

Status Præsens: Slight chronic otorrhœa bilateral with total destruction of membrana tympani. In the left ear a small polypus; on the right mastoid region a cicatrix and a fine fistula almost closed, the skin covering it eroded.

December 23d.—*Operation* : There was on the mastoid an irregular scar with fistulous opening covered with granulations. The soft tissues retracted ; the surface of the bone was irregular, and here the caries extended more posteriorly ; the anterior portion of the bone was apparently normal. Posteriorly a cavity about $1\frac{1}{2}$ cm was formed, anteriorly 2 cm in depth was reached without pus and through very dense bone. I desisted from going farther, admitting that the caries was only in the posterior portion of mastoid. Syringed with sublimate 1:1000. Iodoform dressing.

January 2, 1890.—Was treated at hospital until December 31st, when she left, and came to the office to-day. Has had same treatment by syringing and iodoform dressing.

Prescribed sublimate 1:1000 to be used at home for cleansing the meatus and wound.

February 3d.—Has been treated three times a week as above ; wound cleansed with sublimate 1:1000 or solution of carbolic acid, and packed with iodoform gauze ; cauterized the granulations with nitrate of silver ; catheter.

May 7th.—During February came twice a week, and since then once a month ; the fistula is gradually filling up, now $1 \times 1\frac{1}{2}$ cm in size and 1 cm deep ; has had treatment with occasional cauterizations. Is treated at home by cleansing with carbolic acid 1 to 100, and gauze dressing as instructed.

June 7th.—Fistula has scarcely decreased in size ; still moderate purulent discharge ; no discharge from meatus ; patient will return home and her mother will attend to the ear according to directions.

[*May 15th, 1891.*—Patient has not been seen since June 7, 1890. E. S. C.]

CASE 51.—Acute Purulent Inflammation of Right Middle Ear with Caries of Mastoid ; Operation ; Cure in Seven Weeks.

R. G—, female, age five. First seen on March 15, 1890. Has had a discharge from the right ear for two or three weeks, during which period the child was treated by a physician in Berkeley. When brought she had moderate discharge from the meatus and considerable fluctuating swelling on mastoid. I sent her at once to the German Hospital and operated in the afternoon. Ether narcosis. Incision as usual ; tissues thickened ; granulation on inner surface. In external plate a perforation which was enlarged ;

it was about 2 *cm* from the posterior wall of the external meatus and the external plate was undermined posteriorly. In enlarging the cavity the anterior portion of the mastoid, the usual direction to reach the antrum, was found to be very hard, consisting of small cells with thick trabeculae; posteriorly the external plate was undermined, a piece of which about 1 *cm* long was removed in one, and there was a cavity reaching so far backward that I suspected the sinus to be denuded, very dark blood flowing from the same. Further proceedings were abandoned, the cavity was well syringed, packed with iodoform gauze, and bandaged.

March 16th.—Removed bandage; gauze in mastoid left; no hemorrhage.

March 17th.—Child is up playing; no fever; renewed bandage.

March 24th.—Left hospital.

March 27th.—Treated daily at office by syringing with solution carbolic acid and iodoform dressing.

May 8th.—Has been treated at office five times, the wound rapidly filling up from the bottom; now entirely closed. Dismissed cured.

CASE 52.—Chronic Purulent Inflammation of Left Middle Ear; Extensive Caries of Mastoid; Operation; after Seven Months Still Fetid Purulent Discharge from Meatus, and Small Fistulous Opening Remains on Mastoid.

H. L.—, male, age five. The child had always enjoyed good health until two months ago, when he had earache and the left ear began to discharge. The mother took him five times to Dr. Hund, who prescribed for him, and last time she saw him he advised her to call on me at the San Francisco Polyclinic. Tuesday, April 1, 1890, the child was brought to me; he had profuse supuration from the left ear and the left mastoid region was very much swollen and felt hard, the swelling extending to the mastoid and cervical regions. I sent for my instruments and proceeded at once to etherize the child. Drs. Stroud, Gray, and Redding were present, Dr. Clark assisting. I made an incision parallel to the insertion of the auricle, through the external integuments, which were lardaceous and 2 *cm* thick. Thick pus oozed at once. The infiltration of the soft tissues was so great

that I could not work on the bone, I therefore made a second incision at right angles with the first and running backwards. I was then able to detach the external tissues and expose the bone. The perforations were found in it, one on the external plate close to and at the same height with the external meatus and one on the posterior plate of the external meatus, a narrow bridge of bone separating one from the other. This was first removed with gouge and mallet, the mastoid was then seen to be filled with fungous granulations. With a probe I could penetrate in all directions; I tried to chisel away the external plate, but found it so thin and spongy that the gouge would have no effect. I therefore resorted to Luer's bone forceps, and with it removed the external plate in all directions down to the very apex of the appendix, making an external opening $3\frac{1}{2}$ cm wide. The cavity was filled with granulations of livid red color, which were scooped out carefully. When in the depth no place occupied by granulations was scooped without first ascertaining by careful probing that no perforation of the internal plate existed, and that the granulations did not proceed from the dura mater. The large cavity thus obtained was $3\frac{1}{2}$ cm long, 3 wide, and 3 deep (like in all cases the bony structure is meant), sloping gradually from the edges. Not the slightest trace of undermined external plate was left in order to allow the external integuments to granulate and extend into the cavity. The hemorrhage was considerable, filling the cavity very rapidly and coagulating in it. After thorough irrigation, the cavity was scooped, all clotted blood removed, and a packing with iodoform gauze applied. Bandage as usual. The child recovered quickly from the narcosis.

April 2d.—Dressing removed in my office. No hemorrhage, gauze in mastoid not disturbed. No discharge from the meatus. Irrigated with carbolized water.

April 4th.—Dressing saturated with secretion, removed gauze in mastoid. The cavity and wound look clean. Filled cavity with iodoform gauze. Dressed the same as usual.

April 5th.—Same as last time. Swelling much less. Surface of cavity and lips of wound covered with a gray exudation. Irrigated with carbolized water. Renewed dressing. Child feels well.

May 3d.—Treatment at first daily, then every second day, now twice a week. Cavity, though still very large, is gradually filling in. When not brought to the office he is treated at home by

the mother, by cleansing with carbolic-acid solution and gauze dressing.

October 20th.—Same treatment about once or twice a week ; there is still a small cavity over the mastoid region, with moderate purulent discharge.

[Patient has not returned up to this date (April 14, 1891).

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CASE 53.—Acute Purulent Inflammation of Right Middle Ear ; Caries of Mastoid ; Operation ; Death in Two Months from Phthisis Pulmonalis.

E. H——, male, about fourteen years old. First saw patient on March 28, 1890. Had otalgia for three days, followed by otorrhœa of right side for three weeks ; was treated by his father (a physician) by syringing with antiseptic solutions, then by a specialist, under whose care he now is.

Status Præsens : Mastoid region somewhat swollen and sensitive to pressure ; patient himself looks pale, emaciated, rather tall and slim for his age. Advised continuation of the present treatment, which consists in proper cleansing of ear and local remedies.

March 31st.—Mastoid region very much swollen and sensitive to pressure. Recommended application of ice, and if that was not followed by relief, to have an operation performed.

April 9th.—Saw patient again. He was operated one week ago by having a small incision made 3 *cm* behind insertion of auricle, no escape of pus. Advised further operation to be made to-morrow and arranged for it at County Hospital.

April 10th.—Operation : After cleansing and shaving the mastoid region, washed with sublimate solution 1:1000. Made a linear incision about 5 *cm* in length and 1 *cm* from insertion of auricle. After pushing back the periosteum, used the chisels to a depth of about 5 *mm* in the bone, when pus began to ooze out ; the opening was then enlarged with scoops, emptying out considerable purulent matter from a cavity in the bone corresponding to the antrum ; this was then scraped to remove rough projections of bone. Syringed with sublimate 1:1000, iodoform dressing, bandage.

April 11th.—Called at office for treatment.

April 13th.—Has been treated daily at office by syringing with carbol. sol., iodoform dressing, wound not granulating well. Patient has considerable fever. Temp., 102° F.

April 14th.—Temp. 104° . Same treatment.

April 15th.—Temp. 101° . Patient's general health very poor ; appetite not good ; will treat him at home. On examination he is found to have pulmonary tuberculosis.

May 14th.—For the past month have treated the patient at home ; the wound has been gradually filling up, but constantly discharging more or less purulent matter. Wound now about 1 by 2 *cm* in size and 1 *cm* deep ; will now come to office ; he looks very pale and weak.

May 29th.—Patient was treated at office for eight days and then being too weak to leave the house instructed his father to treat him at home. Saw him on the 26th and 29th ; the external wound not filling up at all ; declining rapidly in general health.

May 31st.—Death from tuberculosis.

CASE 54.—Subacute Inflammation of Right Middle Ear with Empyema of Mastoid ; Operation ; No Communication ; Cure in Seven Weeks.

M. P——, male, age about forty. Was seen by me April 14, 1860. Three or four days before Christmas had otalgia l. d. during eight days ; applied poultices and then had slight discharge, especially at night ; otorrhœa continued one month. Eight days after otorrhœa began, the mastoid began to swell and was very painful. Two months ago applied to Dr. Peroni who opened it.

Status Præsens : Auricle normal ; *Mt* thickened, white ; mastoid region swollen, red infiltration extending down the neck ; $2\frac{1}{2}$ *cm* behind insertion of auricle, a small fistulous opening from which matter can be pressed out. Complains of dizziness in walking. Syringed with carbolic solution, applied bandage and sent patient to German Hospital for operation.

April 15th.—*Operation* : After thorough cleansing and shaving the mastoid region, made incision as usual about 1 *cm* behind insertion of auricle and 6 *cm* long, when considerable pus at once escaped from the soft tissues, and on pressing along sterno-mastoid more was forced out. A probe was passed in this direction about 4 *cm*. The periosteum was already detached from the bone, and by using the chisel purulent matter was obtained on penetrating the external plate. The chiselling was discontinued and the cavity in the bone scraped with chisels until no processes of bone could be felt. Made small incision in the neck 4 *cm* below

the mastoid, and inserted a rubber drain tube, connecting with the first opening. Syringed with sublimate 1:1000, iodoform dressing.

No communication with external meatus was obtained by syringing.

April 18th.—Has had daily treatment at hospital by syringing with carbolic-acid solution, iodoform dressing. No fever after second day. No discharge from meatus; will come to office for treatment.

May 31st.—Has been treated daily by cleansing with carbolic solution and iodoform dressing. The wound in mastoid gradually filling up, now entirely closed, but fistula in neck still kept open with drain tube; this is now left out, the fistula scraped, and covered with strip of adhesive plaster.

June 4th.—Fistula entirely closed; dismissed cured.

CASE 55.—Chronic Purulent Inflammation of Left Middle Ear, with Empyema of Mastoid; Operation; Closure of Fistula in Three Months; Still under Treatment for the Otorrhœa.

D. G. A——, male, age thirty-five, June 17, 1890. Patient sent by Dr. H. Hoffman. Three weeks ago had dizzy spells for two or three days, with fever and vomiting; temperature, 102° . This continued for two weeks. One week ago had sharp pain over left side of face, neck, and shoulder, with swelling at neck, and paralysis of face. Has had otorrhœa on left side for eight years.

Now complains of pain over the entire head, but especially at occipital region.

Status Præsens: Mastoid region slightly swollen; considerable fetid purulent discharge from meatus; after cleansing, *Mt* found entirely gone; tympanic walls thickened, red, and swollen; paralysis of left side of face. Advised immediate operation, and sent patient to German Hospital, where operation was performed.

[November 3d.]—Patient was treated at hospital on the 19th and 20th of June, when he was sent home, and treatment continued by Dr. Hoffman, who dressed it daily with iodoform after cleansing. On the 5th of July I saw him at his house, and found the wound was closing externally; applied a lead nail to keep it open, but this proved so painful that it was removed and iodoform gauze packed in. On July 16th, he went to the country, and the wound was dressed by his wife daily. September 11th, he re-

turned, and I found still some denuded bone exposed in the fistula. The wound, however, was simply covered with gauze, and on the 16th of September closed entirely. He still has a very fetid purulent discharge from the meatus, the middle ear being filled with granulations. I removed several pieces with snare, then with the probe could feel loose pieces of necrosed bone in the vicinity of the cochlea.

November 26, 1891.—Has been treated once or twice a week, have removed two pieces of bone from the inner ear, and for the last month have applied powdered aristol after cleansing; now very slight discharge, and for the first time since treatment began there is no offensive odor. Will continue treatment.

March 21st, 1892.—Patient was treated irregularly until about January 1st, when the discharge ceased. Have seen him several times since but he has had no trouble whatever with the ear.

E. S. CLARK, M.D.]

[CASE 56.—Acute Inflammation of Right Middle Ear, with Caries of Mastoid; Operation: Cure in Six Weeks.]

A. B——, male, age forty-one; consultation June 17, 1890. Mastoid region swollen and very painful to touch. Priessnitz bandage applied for two days; no relief obtained; mastoiditis diagnosed, and on the 19th of June operation saw performed at the German Hospital. He was treated there in the usual manner, until the 21st of July, when the wound had almost closed. He was then treated every third day at the office, and on the 2d of August was dismissed cured.

The notes in this case were lost, and I give a mere outline, with length of treatment, to compare with the other cases.

E. S. CLARK, M.D.]

CASE 57.—Acute Inflammation of Left Middle Ear; Mastoiditis; Operation, with Good Communication, Followed by Facial Erysipelas for Two Months; Cure in Six Months.

E. H——, male, age thirty-three, consulted me June 19, 1890, with profuse purulent discharge from the left ear. This continued for four days, when the mastoid became swollen and very sensitive to touch. Advised an operation.

[October 31st.—Operation was made in usual manner on June 23d. At a depth of about 2 cm considerable pus escaped. There

was scooped out some soft decomposed mass of bone and pus, leaving a large irregularly spherical cavity about $1\frac{1}{2}$ cm in diameter. By syringing, the fluid passed freely into and through the external meatus; dressed with iodoform gauze and bandage. A few days after the operation the patient was taken with facial erysipelas, lasting for two months; in the meantime the discharge from the meatus gradually decreased, and the wound became pale, no granulations forming. Daily application of gauze, saturated with turpentine and oil; the wound then gradually filled up, and a lead nail was applied $2\frac{1}{2}$ cm in length.

The nail was reduced in size until now it is 2 cm long by 5 mm in diameter at base; the nail fits close in its socket, but at its point is a cavity 3 to 4 mm in diameter. Cleansed with a 5 per cent. solution of carbolic acid, and instructed patient how to attend it himself. No discharge from meatus.

December 8th.—Has treated himself as directed. The fistula now corresponds exactly to nail, the small cavity at its point being entirely closed; washed with 5-per-cent. sol. carbolic acid, and left out the nail.

December 10th.—Wound entirely closed; membrana tympani thickened; opaque, no perforation; h = $\frac{0.4}{5}$. Dismissed.

E. S. CLARK, M.D.]

CASE 58.—Acute Purulent Otorrhœa Sinistra; Empyema of Mastoid; Two Operations; Cure in Four Months.

F. S—, male, age fifteen, called at the office July 9, 1890. Two weeks ago went in bathing and the next day had otalgia followed by otorrhœa on left side.

Status Præsens: Very profuse muco-purulent discharge from meatus; considerable swelling over mastoid region and side of neck, some pain on pressure. After syringing an opening is seen in external meatus, through which matter oozed when pressure is made on the mastoid and on the neck along the sterno-mastoid. On probing through this the bone can be felt. Advised immediate operation and sent patient to the German Hospital; was operated on at 3 P. M. by Dr. Morse, Dr. Clark assisting. The external plate was chiselled away and pus appeared. Communication with the external meatus was obtained through the opening above mentioned, and after syringing thoroughly, bandage applied.

July 10th.—Considerable discharge from wound, and on pressing below, following the course of the sterno-cleido-mastoid, a large quantity of matter is forced up. Applied a drain tube 4 *cm* long into this sinus; left the hospital and will call at office for after-treatment by Dr. Clark.

July 11th.—Still considerable discharge, and on probing, rough bone is felt around the walls of the wound: this was removed with curette. Treatment by cleansing with carbolic-acid solution, iodoform dressing.

August 11th.—Has had daily treatment in the same manner; the opening in the external meatus closed, and no communication between this; slight discharge from the middle ear and fistula, but profuse discharge from the wound, especially from the sinus along the sterno-mastoid. Another operation was performed, opening this sinus at its lower extremity and inserting a rubber drain tube. At the same time necrosed bone was removed from the old cavity by scraping, and iodoform dressing applied.

[October 28th.—There has been steady gradual improvement; the drain tube was left out after several days, and the sinus closed up.

The fistula slowly healing from the bottom, no nail being required, wound dressed simply with iodoform gauze packed into it after cleansing. Now there is a shallow cavity 1 by 2 *cm* in size filled with healthy granulations. Slight discharge from middle ear.

November 7th.—Has had the same treatment daily. Now the wound is closed and covered with epidermis. No discharge from middle ear. Dismissed.

E. S. CLARK, M.D.]

CASE 59.—Acute Inflammation of Left Middle Ear; Empyema of Mastoid; Operation; Cure in Two Months.

A. A —, male, age thirty. First seen August 12, 1890; for two or three weeks had been suffering with otalgia of left side; *Mt* slightly thickened and opaque; hearing considerably diminished; otherwise nothing abnormal found.

Treated several times with catheter and dismissed. After two weeks he returned, stating that for the past forty-eight hours he had suffered with intense pain in the left ear; had made hot applications and applied leeches, etc., without relief. Now there is severe otalgia, moderate purulent discharge from meatus, mastoid region swollen and very sensitive on pressure. Advised

an immediate operation, and sent patient to the German Hospital for that purpose.

[October 31st, 1890.—Was operated in the usual manner on the 26th of August, treated at hospital for several days, then at the office during the month of September. Discharge from meatus stopped several days after the operation. October 1st, the wound presented a healthy appearance, 1 by 2 cm in size and $1\frac{1}{2}$ cm deep; treated daily with carbolic acid or sublimate solution and iodoform gauze dressing. It granulated nicely and closed October 22d without application of a nail. Now only a linear cicatrix is visible with very slight depression. Hearing h = $\frac{9}{5}$. Dismissed cured. E. S. CLARK, M.D.]

CASE 60.—Chronic Purulent Inflammation of Right Middle Ear with Mastoiditis; Operation; the Wound Allowed to Close after Four Months; No Cessation of the Otorrhœa.

J. D.—, male, age eighteen. Consultation August 16, 1890, presenting the following history: Has had a discharge from both ears since he was a child, sometimes profuse and again very slight; has never had any pain until the last few days. Now complains of otalgia on right side.

Status Præsens: A. D., profuse purulent discharge filling external meatus, very fetid; after cleansing, the membrana tympani not visible, only a thickened ring remaining around its former attachment; malleus entirely gone; fundus filled with granulations; slight pain on pressure over mastoid; no perceptible swelling.

A. S. about same condition as A. D., but no pain on pressure.

Treatment: Syringing with carbolic-acid solution, 1 per cent. Politzer, Priessnitz to right side.

[October 29th.—Was treated as before for ten days; the right side gradually growing worse until August 27th, when an operation was performed at the German Hospital by Dr. Ferrer, myself assisting. There was considerable swelling of the mastoid region, the soft tissues being over 1 cm thick. No pus was obtained, however, until the bone had been penetrated to a depth of 3 mm. There a cavity was reached connecting with the antrum, from which escaped a teaspoonful of sanguineous, purulent, very fetid matter. On syringing, the fluid passed very freely through the meatus, and after scooping out the cavity and removing the sharp edges of bone, it was syringed with sublimate 1:1000 and iodo-

form dressing applied. Was treated several days at the hospital, then almost daily at the office until the present time. The wound gradually closed, and a lead nail 2 *cm* in length was inserted. At present there is still considerable discharge from the meatus.

Roughened bone can be felt by probing at the bottom of the fistula.

December 1st.—Treatment daily by syringing with carbolic acid or sublimate solution ; the fluid sometimes passes from meatus to mastoid, and then again, there is no communication whatever ; this is followed by an application of powdered iodoform or boric acid. The nail has twice been shortened ; it is now 13 *mm* long ; the discharge from the meatus is sometimes very slight and then again profuse, but nearly always very fetid.

December 23d.—There has been no communication of the fistula with the external meatus for two weeks, and one week ago the nail was left out ; the wound is now completely closed ; no diminution, however, in discharge from the meatus ; it still retains its disagreeable odor.

At this date, June 1, 1891, the patient has not been seen since the last entry.

E. S. CLARK, M.D.]

TWO NEW AURAL INSTRUMENTS.

By E. B. DENCH, M.D.,

AURAL SURGEON N. Y. EYE AND EAR INFIRMARY.

(With two drawings.)

WITH the large number of instruments already at the command of the aural surgeon, one can scarcely understand the necessity of adding to the list. Two instruments, however, devised for my own use, have been of such service that I desire to present them to the profession.

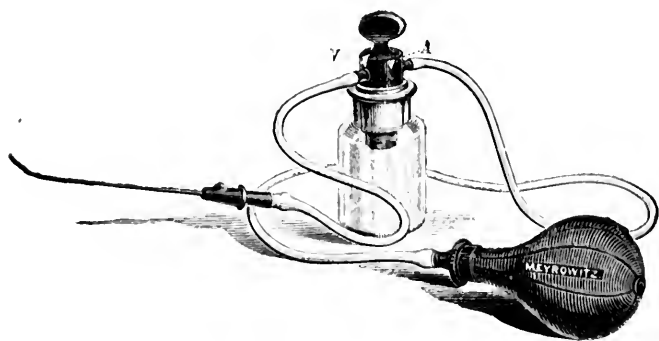


FIG. 1.—Instrument for Inflating the Middle Ear.

The first is an apparatus, by means of which the operator can inflate the cavity of the tympanum with either air or medicated vapor, without removing the inflating bulb from the proximal extremity of the catheter, in making this change in the fluid inflated. The apparatus consists of a small wide-mouthed bottle, in which is placed a sponge saturated with the volatile fluid, the vapor of which we

desire to force into the tympanic cavity. The stopper of the bottle is provided with two short tubes, one on either aspect, which are connected with the inflating bulb on the one hand and the Eustachian catheter on the other, by means of flexible rubber tubes. By means of a small thumb-screw upon the top of the stopper, the core of the latter can be rotated easily, and by simply turning this thumb-screw through an arc of 90° the current of air from the bulb is driven either directly through the rubber tubes into the catheter and thence into the middle ear, or is made to pass down through the bottle before entering the catheter, thus charging it with the vapor contained within the reservoir. A quarter turn of the thumb-screw is all that is necessary to effect the change from air to medicated vapor, or the reverse, the catheter meanwhile remaining undisturbed in position.

The advantage which the device presents, is that it enables us to first clear the tube by means of a current of air, and then, without disturbing the position of the instrument, to make our application to the mucous membrane of the tympanum. If this method be followed, very little of the medicated vapor escapes into the throat, and the attendant discomfort of such applications is correspondingly diminished. The instrument is readily understood from a reference to Fig. 1.

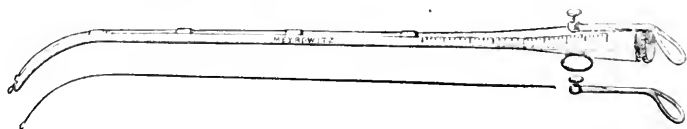


FIG. 2.—Eustachian Bougie.

A second instrument, shown in Fig. 2, which has been of service in many cases, is a metal tongue for the Eustachian tube. For the purpose of dilating the Eustachian tube, I for a considerable time made use of fine whalebone urethral guides for the smaller sizes, and of woven urethral bougies for the larger. It was difficult to find a woven instrument of the sizes from 2-5 F. which was flexible enough to take the curve of the catheter, and yet firm enough to overcome

the resistance of a pathological narrowing in the tube. Another difficulty which was met with, was the fact that in using the dilating instruments of large calibre the catheter had to be increased to such a size that it could not, in many cases, be passed through the nasal chambers without the use of force, and then so completely filled the passages as to interfere seriously with its delicate manipulation. Again, the friction of the bougie in passing along the curved portion of the catheter was so considerable that the operator could not tell whether he was exerting his strength in overcoming an obstruction in the Eustachian canal, or whether the resistance was due entirely to the friction of the bougie within the catheter. To overcome these difficulties, the instrument shown in the cut was devised. It consists of an ordinary pure silver Eustachian catheter of medium size, along the convexity and superior aspect of which are secured several small guides. The tip of the catheter, instead of being cut off at right angles to the bore, is so formed that the section presents the shape of an ellipse.

The superior aspect of the instrument for two inches, beginning at the proximal extremity, is graduated in the fractional parts of an inch.

The bougies are made of german silver, and are bulb-tipped, the shaft being worked down to as small dimensions as are consistent with strength. The shaft is of the same size in every instance, but the tips vary from 2-5 of the French scale. In operating the instrument the shaft is threaded through the guides upon the catheter, and when the bulbous tip is drawn up to the first guide it is found that, owing to the oblique section of the extremity of the catheter, the bulb of the dilator completes the superior wall of the tip of the catheter, thus permitting a current of air to be forced through the instrument and into the Eustachian tube, with the bougie in position. To the proximal extremity of the shaft of the bougie a small handle is fastened, by means of a screw, thus enabling the operator to advance the bougie to any desired extent, the distance being indicated by the passage of the handle over

the graduations already mentioned, marked upon the superior aspect of the catheter. By the small size of the shaft, and the employment of the rings, instead of a tube, as guides, the friction is reduced to a minimum, and the actual resistance caused by the contraction in the canal is easily determined.

Another advantage lies in the fact that the bougie does not occupy the lumen of the catheter, and hence, with the bougie in position, ready for introduction, in case of necessity, we can first inflate, and determine the condition of the tube, and then dilate without removing the catheter. The pervious lumen also enables us to avail ourselves of the use of the auscultation tube in locating the Eustachian orifice, and to then advance the bougie without a change in the position of the instrument.

The use of the metal bougie is not attended with any more pain than is the use of the woven, celluloid, or whale-bone instruments, while the chance of the instrument breaking while in the tube is much reduced, and the information imparted to the manipulator, as to the physical conditions, is more accurate. The bougie and catheter being flexible, any curve can be given to the instrument to suit the individual case.

It would seem that the guides might offer an obstacle to the introduction of the catheter, but such does not seem to be the case.

The same instrument may be used to make applications to the Eustachian tube, by substituting for the bulbous bougie a piece of No. 5 piano-wire. This is threaded through the guides in the manner already described, the handle is secured to the proximal extremity, while the distal extremity is roughened, and wound with a small pledget of cotton. This cotton may be saturated with an appropriate solution, and carried to any part of the canal, the exact location being determined by means of the graduations.

Dr. Buck, of this city, was one of the first to suggest applications to the Eustachian tube in this manner, although I think that he confined his applications almost entirely

to the pharyngeal orifice. He also made use of the ordinary catheter, passing the wire, tipped with the pledget, through the lumen of the catheter. It was thus impossible to inflate and make an application without disturbing the catheter to some extent, which difficulty is, I think, entirely obviated in the instrument above described.

In conclusion, I desire to express my thanks to E. B. Meyrowitz for the careful manner in which he has carried out my ideas in the manufacture of these instruments.

SOME SUGGESTIONS CONCERNING THE PROGNOSIS AND TREATMENT OF CHRONIC NON-SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR.

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THE subject of the prognosis and treatment of chronic non-suppurative inflammation of the tympanic cavity is so broad, that it is scarcely necessary to say that it is not the intention of this paper to furnish an outline of the prognosis and a résumé of the treatment of all cases in this category. It is my intention simply to present a few facts which have been impressed upon me in my work, and to add such confirmation as literature may furnish.

The train of symptoms of which these patients complain are either constant, progressive, or characterized by exacerbations, during which periods the symptoms are much more troublesome than during the intervals. For the cause of the constant or progressive symptoms we must look for some long-standing or increasing pathological condition, while the exacerbations are to be explained by influences of an evanescent character. We except here psychical disturbances, as we are dealing only with physical conditions.

The pathological conditions which give rise to the train of symptoms from which these patients suffer may be located in any part of the tympanum. Within the middle ear we may have rigidity or relaxation of the ossicular chain, in either case interfering with the direct transmission of sound waves to the labyrinth. The rigidity may be due to collapse of the membrana tympani from an obstructed Eustachian tube, forcing

the ossicular chain inward, to ankylosis of the ossicles with one another, to fixation of the stapes within the oval window, to adhesions between the ossicles and the walls of the atrium or epitympanic recess, either from a rigidity of the normal folds of mucous membrane, or the development of new connective tissue, to the presence of fluid or inspissated mucus acting as a load, interfering with the vibration of the ossicles; all of these conditions being a sequel of a previous or slowly advancing inflammatory condition. On the other hand, the inflammatory process may have resulted in a relaxation of the delicate structures which bind the ossicles together, or hold them suspended in the tympanic cavity, in which case the transmission of sound waves will be equally faulty, the two larger ossicles acting as an obstruction to the vibration of the stapes. Again, the tympanic membrane itself may be too thick to vibrate properly, or so much relaxed that it cannot transmit vibrations; in either case acting as an obstruction. What the original cause of the condition is cannot be fully discussed in this paper; undoubtedly in many cases the origin is in an inflammation of the mucous membrane of the Eustachian tube, with the attendant collapse of the membrana tympani, and hyperæmia of the tympanum, followed by an exudation of serum, or by an inflammatory process characterized by the production of new connective tissue. The stenosis of the tube may be the result of increased secretion blocking up its lumen with mucus, or it may be the result of swelling of its lining membrane, with paralysis of the muscles. Sooner or later there is developed in many cases a hyperplasia of the walls of the tube, with a permanent narrowing of its calibre. It must not be understood that all cases are due primarily to Eustachian obstruction; I believe that the pathological process may begin in the tympanic cavity and give rise to the formation of extensive adhesions, with very little or no inflammation of the Eustachian tube, as evidenced by its patency upon inflation. Gout and rheumatism undoubtedly exert a causative influence in many such cases. There is also evidence to show that in many instances the affection is of neuro-pathic origin; the function of the trophic nerves of the tym-

panic cavity being in some way interfered with, there results an impairment of nutrition of the lining membrane of this cavity, in virtue of which the connective-tissue structures lose their elasticity and the ossicular chain becomes rigid. From whatever cause, the final condition is one of impairment of the normal resiliency of the conducting mechanism.

The causes of the exacerbations are most frequently exposure to cold, or are due to indiscretion in habits of life, in either case resulting in a swelling of and increased secretion from the mucous membrane of the Eustachian tube, narrowing its calibre, and by collapse of the tympanic membrane hampering the vibrations of the ossicles. Our prognosis in any given case, then, will be first with reference to the exacerbations, and second with reference to our ability to overcome such permanent conditions as already exist, and prevent their further progress.

No one will question, I think, our ability to prevent the exacerbations. As the result of exposure to cold, there is set up an acute catarrhal inflammation of the mucous membrane of the nose or naso-pharynx, which parts in many cases are already in a state of chronic inflammation. It is here that the greatest benefit is derived from the treatment of the nose and naso-pharynx. Obstructive lesions in both localities should be removed and the inflammatory conditions controlled. In this manner, with due attention to hygienic measures, the liability to recurrent colds is broken up, and the frequent attacks, which not only increase the severity of the chronic symptoms, but to a marked degree induce permanent pathological changes, cease. As remarked above, these exacerbations are attended with swelling and alteration of secretion in the mucous membrane of the Eustachian tube. My experience has been that changes dependent upon a morbid condition of the nose and naso-pharynx, and benefited by treatment of these parts, are almost without exception evidenced by the presence of mucus in the Eustachian tube, partially or completely occluding it. When the process has gone on to hypertrophic changes in the walls of the tube, thus permanently narrowing its calibre, other measures are necessary; these will be discussed when

we come to speak of treatment. So much, then, for the exacerbations, which we can certainly relieve.

Next, what signs furnish us with an index of the amount of improvement which we can bring about in the tympanic cavity? The examination with a series of tuning-forks has afforded me a method upon which I rely more and more. For this purpose I use a series of five forks, as advised by Hartmann,¹ the lowest registering 128 vibrations per second, the highest 2,048, each fork differing from the one immediately below and above it by one octave. Ordinarily the tuning-fork is used to determine by means of the well-known test of Rinne whether we have to do with any lesion of the internal ear. The degree of impairment of hearing necessary for the test to be depended upon has been determined by Lucae² to be that in which the whispering voice is not heard at a greater distance than one metre, or about forty inches; an absolute diminution in bone-conduction when this degree of impairment has not been reached also usually denotes the same condition. In testing with the series of forks, as above described, a lesion of the receptive apparatus is usually evidenced by total deafness to certain notes, both by air- and bone-conduction. While this test enables us to determine the involvement of the receptive apparatus, a comparison of the relative duration of air- and bone-conduction, as tested by the above series of tuning-forks, offers, I believe, a valuable basis upon which to form an opinion as to the probable result of treatment.

In testing a large number of cases of chronic non-suppurative inflammation of the middle ear, one will become impressed with the fact that the reversal of the normal relation between air- and bone-conduction begins with the lowest notes of the scale, and as the disease advances gradually ascends the scale, until finally the higher notes are heard equally as well, or even better, by bone- than by air-conduction. In other words, the weighting of the conducting apparatus by anomalies in tension interferes first with the transmission of the low notes, and as the pathological condition

¹ *Die Krankheit, des Ohres*, Berlin, 1880, p. 32.

² Cited by Berold, *Allg. Wien. med. Ztg.*, 1887, p. 183.

increases, the transmission of the higher notes is also interfered with. Out of thirty-eight cases in which these tests have been made, and the cases followed, in twenty-seven, preponderance of bone-conduction over air-conduction existed for from one to four octaves, and in twenty-five of these cases treatment was followed by decided improvement. When the rigidity is so great that the fork C' is heard better through the bone than through the air, this test in my cases has denoted such a degree of rigidity that treatment has failed to overcome it; in other words, the fork of 1,024 vibrations per second seems to furnish a somewhat constant limit as to the amount of rigidity which we are able to overcome by treatment. This was well illustrated in a case in which upon one side the preponderance of bone-conduction over air-conduction existed for the first four octaves, while upon the other side the entire series of forks was heard better through the bone than through the air. This latter ear failed to respond to treatment, while the other improved. The rule is of course not absolute, but with proper care in applying the test, repeating it several times, if in doubt as to the correctness of the patient's answers, and taking into account also the degree of impairment to whispered speech, we shall be able to draw valuable inferences from the examination. The degree of obstruction of the Eustachian tubes should also be taken into account in applying the test, and if this is found to be great, the trial with the forks should be repeated a few moments after inflation, if it is desired to gain accurate information as to the amount of structural impairment in the sound-conducting apparatus.

Most of the cases reported above were of the dry variety, the sclerosis of the German writers. While I do not hold the sign as invariable, I do believe that it possesses a considerable amount of importance. The length of time the disease has existed, the age of the patient, the general condition, etc., are all factors in prognosis, which are so well known that mention need scarcely be made of them here. The length of time which the symptoms have persisted may aid us materially in our prognosis, in connection with the above tests. We have seen that the principle involved is

merely a mechanical one, being a loading down of the transmitting mechanism; it follows, then, that if the tests with the tuning-forks show a marked interference with this mechanism, our chances of overcoming it will be much better, if the disease has existed but a short time, than if it has been of long duration. As illustrating this, a case presented at my clinic some time since with a history of impaired hearing in one ear for several years, while in the other defective audition was of short duration. The tuning-fork reactions were the same upon both sides, bone-conduction being greater than air-conduction for the first four forks. By inflation, however, the hearing upon the side recently affected became immediately normal, while upon the other, where the affection had existed for a long time, only slight improvement followed the single treatment. In this instance the load upon the transmitting mechanism was the depressed membrana. Age may confuse us in our prognosis based upon a tuning-fork record, unless we remember the affection which Roosa¹ has so aptly described as presbycusis. This is a condition met with in people beyond middle life, in which the functional activity of the auditory nerve is to an extent impaired, particularly in reference to the preception of sound by bone-conduction; hence in an individual past middle life in whom the hearing is considerably impaired, and in whom the bone-conduction is not in excess of air-conduction, our prognosis should not be as unfavorable as in the same condition in a younger person, since these signs do not at this age positively exclude disease of the middle ear, and treatment applied in this direction may be beneficial, especially if there is any evidence of a catarrhal condition of the upper air tract. This deceptive effect of age is well illustrated in several of my own cases, in which the first glance at the fork reactions seemed to indicate a lesion of the receptive apparatus, and yet treatment directed to the middle ear was followed by improvement. In one case, that of a man aged sixty-two, the reaction to the tuning-forks, in connection with the impairment to whispered speech, seemed to point to a lesion of the receptive appa-

¹ *Trans. Amer. Otological Society*, 1885.

tus, although the clinical history of such an affection was wanting. Treatment directed to the middle ear restored almost normal hearing.

With reference to secondary involvement of the internal ear, we must rely mostly upon complete failure to perceive certain notes of the scale, and also upon an absolute shortening of bone-conduction. Any such involvement of necessity renders the prognosis much more grave.

As regards treatment, we must have a clear idea of the pathological conditions in each given case. We have seen that the obstruction may be in the membrana tympani, tympanic cavity, or Eustachian tube, and we must in each instance remove such obstruction as far as possible before pronouncing the condition beyond hope of relief. Of internal medication little can be said, other than what would suggest itself to every physician. The diathetic conditions of gout and rheumatism undoubtedly, in certain cases, exercise a causative effect upon chronic inflammatory conditions within the tympanum, and medication in this direction may frequently be of service. The one drug which has been of service when these diathetic conditions were wanting has, in my experience, been pilocarpin, as suggested by Kosegarten.¹ We should certainly use this drug if there is the least evidence of involvement of the receptive apparatus, and it has proved efficacious in some of my own cases even where there were no evidences of labyrinthine invasion. With reference to the Eustachian tube, recurrent attacks of inflammation in this location are of great damage in these cases, and especially in childhood and youth, constituting the most frequent cause of the tympanic affection, the history being marked by repeated attacks of impaired hearing, following upon colds in the head, each one leaving the patient a little worse than before the attack. For the purpose of combating such attacks, treatment directed to the nose, naso-pharynx, and oro-pharynx is of prime importance. Obstructive lesions, such as enlarged pharyngeal or faucial tonsils, deformities of the septum, and hypertrophic rhinitis should be dealt with radically, and the upper air passages put

¹ ARCH. OF OTOLGY, vol. xvii., p. 95.

in a perfectly healthy condition. In this way farther progress is stopped, and in the cases seen early in life, frequently retrograde changes take place, as the result of the restoration of the normal circulation to the tympanic cavity and Eustachian tube, ending in a complete cure. In older cases treatment of the upper air tract prevents the recurrent exacerbations.

If the obstruction in the tube is caused simply by swelling or secretion, inflation by means of the catheter will overcome this. The inflation may be accomplished with air simply, or with medicated vapor from one of the volatile substances—such as menthol, iodine, camphor, benzoin, etc., the intention being to restore the mucous membrane to the condition of health. Applications of astringent solutions to the mouth of the tube, by means of a curved applicator passed through the anterior nares, may be beneficial. In some instances when these have failed, I have obtained excellent results by making the application to the entire length of the tube by means of a pledget of cotton twisted about a piece of fine wire, which being saturated with the solution is inserted in the same manner as a bougie. This will sometimes prevent the accumulation of thick secretion in the tube when all other means fail. If the walls of the tube have become permanently thickened, the procedure which in my hands has yielded the most satisfactory results is the use of Eustachian bougies. Any permanent narrowing of the tube is especially troublesome in instances where the intratympanic structures and *membrana tympani* are relaxed, as a very small amount of secretion will completely close such a tube, resulting in the collapse of the *membrana* and ossicles, with consequent impairment of the transmission of sound waves. Bougieing in these cases has been attended by excellent results, even when the obstruction had existed for years. Personally I prefer the metal bougies which I have devised for this purpose, but others no doubt accomplish the end equally as well. In connection with the dilatation, massage of the tube may be practised, after the manner advised by Urbantschitsch.¹

¹ *Arch. für Ohrenheilk.*, vol. xxii., p. 118.

With a constantly patent tube our efforts must next be directed to the tympanic cavity. Here observation has taught me that many cases only improve after a long course of treatment. Inflation, practised two or three times weekly, and later at longer intervals, in a large number of cases will yield good results, even though there may be no improvement in the first few weeks or even months. From the nature of the process time is a great element, and we can scarcely hope in a few weeks to effect an absorption or relaxation of adhesions which have taken years to form.

In a number of cases in which local treatment has been followed faithfully for many months the most gratifying results have been obtained, where if the treatment had been discontinued at the end of a few weeks no improvement could have been recorded. To fully test the value of such treatment it must be kept up for a long period, unless it causes an aggravation of the condition, when of course it should be discontinued at once. The beneficial effect of inflation seems to be largely mechanical, by stretching the adhesions, and in some cases causing an absorption. Menthol, camphor, or iodine vapor may be used in inflating, as already described. These substances undoubtedly exert a stimulating effect upon the tympanic mucous membrane and favor resorption. They certainly relieve tinnitus in a certain proportion of cases in which simple inflation is without effect. As the beneficial result of inflation depends more upon mechanical action than upon the ventilation of the tympanic cavity, it is often well to compress the bulb with considerable force and to continue the inflation for some time; the exact amount of force must vary with each case, according to the amount of resistance to be overcome. Passive motion by means of Delstanche's masseur, or kindred instruments, has not in my hands proven as beneficial as inflation. In conjunction with inflation, systematic exercise of the organ by means of a conversation tube or otophone is of unquestionable benefit, acting in much the same way as passive motion to a stiff joint. The method of carrying this out is to direct the patient not to use the instrument regularly for the purpose of hearing ordinary

conversation, but to allow an attendant to read to him through the instrument for a short period once or twice daily, repeating such words as are not understood, from ten to fifteen times. In this way the structures within the middle ear are exercised in a perfectly natural manner. Another benefit which is derived from this method, is that it teaches these patients, to a certain extent, a new language, since the diseased conducting apparatus may never transmit sounds exactly, and by practice they learn to interpret correctly the modified sounds which are heard. In two of my own cases such a plan has been of great benefit. The idea is not a new one, and was suggested long ago by Toynbee.¹

If the above efforts fail to afford relief, our next resort should be to surgical procedure. The first step should be an exploratory myringotomy, in that the incision will afford exit to the fluid if any be present within the tympanum, and will enable us to wash out the cavity, either through the Eustachian tube or meatus, in case inspissated secretion is found. It will also enable us to test the mobility of the stapes, as suggested by Schwartze,² the knowledge of which condition is of the first importance in determining subsequent procedure. Through the incision we may also divide any adhesions which may exist in the cavity, and when indicated to perform tenotomy of the tensor tympani or the stapedius muscles, and also sever such adhesions as may exist in the epitympanic space. If the hearing is improved by the myringotomy, but falls when the wound closes, our efforts will be directed towards maintaining a permanent opening. Repeated perforation with sulphuric acid can be performed, as the operation is not attended with much pain, and very little reaction follows. If the simple myringotomy does not improve the hearing, or if repeated perforation seems undesirable, there is no question in my mind as to the advisability of removing the membrana, malleus, and incus, in that it affords a perfect drainage of the epitympanic space, and almost certainly prevents any serious inflammatory reaction following our operative procedures. The

¹ "Diseases of the Ear," American edition, Philadelphia, 1865, p. 433.

² *Arch. für Ohrenheilk.*, vol. v., p. 270.

membrane may form again, but its destruction or removal becomes a much more simple matter with the two larger ossicles out of the way, and the epitympanic recess freed from connective tissue, than when this space, with its numerous bands, offers opportunity for foci of suppuration. With a movable stapes, it is my impression that we should excise as little of the membrana as possible in removing the two larger ossicles, and should so make our incisions as to favor an adhesion between the head of the stapes and the membrana, using this latter as a means of transmitting the vibrations of a larger column of air to the stapes. The membrane here acts in the same manner as the cotton pledget, placed over the head of the ossicle in purulent cases, which so often improves the hearing. Extraction of the malleus and incus can be easily effected through a comparatively small opening, but to cause the adhesion between the membrana and the stapes is a much more difficult matter, and in the case where I performed the operation I am not certain that this was accomplished, although the result was very satisfactory. When the motions of the stapes are not found to be free, the tissues about its base should be divided, as advised by Kessel,¹ and if this does not accomplish the desired end we may attempt to mobilize the ossicle, as advised by Boucheron,² Miot,³ and others. If this is to be done, however, I believe that the membrana, malleus, and incus should be removed, both to guard against any inflammatory action and to permit of access to the parts in case a secondary mobilization becomes necessary. Miot has reported good results from this operation in non-suppurative cases, as well as in old purulent ones. In instances belonging to the latter class, I have already testified to its merits.⁴ Attention must also be given to the condition of the mucous membrane in the neighborhood of the round window, in that thickening in this location may hamper the vibration of the perilymph, even if the stapes itself is not firmly fixed.

¹ *Arch. für Ohrenheilk.*, vol. xi., p. 212.

² *Bull. Méd. de Paris*, 1888, p. 553.

³ *Revue de Laryngol.*, vol. xi., 1889, p. 49.

⁴ *ARCHIVES OF OTOTOLOGY*, vol. xx., p. 13.

Multiple incision of such tissue will probably be the most satisfactory way of dealing with it.

The question of removal of the stapes is, I suppose, at present not to be thought of, yet when we consider the instances in which its removal has been accidentally accomplished, with no bad results, and also the experiments of Botey¹ and Kessel² upon animals, I do not think that we are entering an entirely speculative field, when we hope that further investigation in this direction may enable us to turn these researches to some practical end. We can never promise in a given case what the amount of improvement will be from operative procedure, but we can promise that the condition will not be aggravated, and that the chances of improvement are certainly fair. The one point which I would urge is a thorough study of each case, and a prolonged trial of the milder methods of treatment; testing the hearing at frequent intervals in order to accurately note the progress. Surgical measures should certainly not be advocated until other measures have had a thorough and prolonged trial and have failed; but when they have failed we should not delay our operative interference. Cholewa³ states that operative measures are not likely to be followed by good results if the bone-conduction for the forks C and C' is of less than eight seconds' duration, while the aerial conduction for the first five octaves should not fall below one fourth the normal duration. He, however, remarks that even in these cases we may improve the hearing, but with such a high degree of impairment a guarded prognosis should be given. There is one very interesting point in connection with the operative procedures to which attention has been called by Cholewa and others, and that is the fact that surgical interference upon one ear frequently benefits the ear of the opposite side. In one of my own cases an excision of the ossicles of the left ear more than doubled the hearing distance upon the opposite side and arrested the tinnitus, while in the ear operated upon the hearing distance was

¹ *Amer. Jour. of Med. Sciences*, vol. ci., p. 632.

² *Loc. cit.*, p. 207.

³ *ARCH. OF OTOLGY*, vol. xix., p. 151.

slightly increased, and the tinnitus very much reduced. Such improvement can be explained by accepting the investigations of Baginsky,¹ Edinger,² and others, which demonstrate a crossing of the acoustic vibrations in the medulla. The above clinical facts suggest that with both ears affected, our operative procedure should be directed toward the poorer ear, while with a single ear affected and a family history of impaired hearing, especially if there is the least evidence of involvement of the opposite side, early operation should be advised upon the poorer ear, both for the purpose of benefiting it, and for preventing the progress of the affection in its fellow.

In conclusion I would say that I trust my readers will not consider that the preparation of this paper has consisted in a collation from literature of every conceivable form of treatment of the disease under consideration. With scarcely an exception, I have made a thorough trial of all the means suggested here, and my opinions are based on the results obtained. With reference to surgical interference I can truly say that in no case have I ever seen a bad result follow any of the operations, either immediately or subsequently, and in nearly all there has been a certain amount of improvement, either in diminishing the tinnitus or improving the hearing.

¹ *Arch. für Ohrenheilk.*, vol. xxiv., p. 54.

² *Anat. Anzeig.*, 1887, Nos. 6 and 8.

MECHANICAL TREATMENT OF TENSION ANOMALIES.

By CLARENCE J. BLAKE, M.D., BOSTON, MASS.

THE delicacy of the sound-transmitting apparatus of the human ear, and the microscopic minuteness of its adjustment in responsive vibration to a wide range of musical tones, are in themselves suggestive of the effects which may accrue from even slight derangement of the comparative adjustment of its component parts.

That the effects of such derangements are not more frequently brought to our notice is due principally, probably, to the two facts, that there is in nature a considerable margin of compensation, and that the minor effects are likely to be noticed only by trained observers.

Among these trained observers we should expect to find musicians in the first rank, and it is among people of this profession, therefore, that the most interesting cases of the effects of minute changes in the sound-transmitting apparatus upon the hearing for musical tones, either of some instrument or of the individual voice, occur.

The first of the cases here submitted is that of a musician whose hearing in the right ear responded to all normal tests, the ear itself presenting a normal appearance.

In the left ear he had previously had a suppurative process in the upper portion of the tympanic cavity, with perforation of the membrane of Shrapnell, the lower portion of the membrana tympani remaining intact with but slight thickening of its mucous coat, and the ear responding to hearing tests at the average of very nearly two thirds of the normal hearing.

The patient was an expert violinist, and as the suppurative process had occurred in childhood recalled no special instances of inconvenience from impairment of hearing in the left ear.

During the winter previous to his first visit, however, he had had a series of head-colds accompanied by a sense of fulness in the left ear, which had led him to practise Valsalvian inflation frequently for the sake of the relief it afforded.

Three days before his visit he had noticed while practising on the violin that when the head was bent forward and to the left, as is often the custom in the rendering of more delicate passages, the tones of the violin sounded dull in the left ear, and there was a definite loss of timbre perception.

When the head was raised this disability disappeared, to immediately recur on the lowering of the head to the position mentioned.

Examination of the left ear showed the external auditory canal free, the membrana tympani intact, as has been mentioned, and a small round dry perforation of the membrane of Shrapnell.

Tests with tuning-forks and with high musical tones corroborated the testimony given by the patient in regard to the effect of the change in the position of the head on the hearing for qualitative overtones in the left ear.

Valsalvian inflation exhibited a considerable movement of the membrana tympani outward, and evidenced a relaxation of the tensor tympani, malleo-incudal capsular ligament, and the corresponding attachments, such as would favor a separation of the malleo-incudal articulation within such limits as would permit the passage of the larger sound-waves of the medium and lower tones but would result in the loss in transit through the articulation of the motion incident to the shorter sound-waves of the qualitative overtones.

Inflation of the middle ear, extension of the membrana tympani outward, and corresponding tension of the capsular ligament, and increased contact pressure of the articulating surfaces restored in a measure the ability of the parts to transmit the short sound-waves, and still further increased the hearing for the qualitative overtones, which had been found, it should have been said, to be somewhat imperfect even with the head of the patient erect.

It was evident, therefore, that any mechanical arrangement which would bring about a more natural adjustment of the malleo-incudal articulating surfaces, and would maintain them in that

position long enough to allow the relaxed tissues to normally contract, would not only relieve the patient of his recent embarrassment but would probably have more permanent beneficial effects.

The requisite pressure on the short process of the malleus was effected by means of a strip of thin, elastic rubber tissue three *mm* in width and twelve in length, which being seized at the two ends with the angular forceps was carried into the ear under good illumination, with the convex portion of the resultant ellipse in contact with the short process, when the two ends being released from the grasp of the forceps and allowed to spring outward against the walls of the canal, a pressure which was subsequently estimated by experiment to be equal to the support of fifteen milligrammes was exerted upon the short process.

With this support to the relaxed parts it was found that the head could be placed in any position without impairment in hearing for over-tones and the patient was enabled to resume his professional work undisturbed.

The improvement thus effected lasted for very nearly a week, at the end of which time it was found that the rubber, more strongly adherent to the skin at its ends than at its convexity, had moved outward with the progressive growth of the dermoid lining of the canal, so that pressure was no longer exerted on the malleus.

As the result of this experience and also of the fact that in making the first application the freshly cut ends of the rubber were found to adhere under the pressure of the forceps, thus preventing the springing apart of the ends when released, two changes were made in the method of application.

The two ends of the rubber strip were cut, one at an angle, and the other on a curve, the curved end being placed toward the posterior wall of the canal and the convex surface of the rubber strip; that portion which was to be brought into contact with the malleus was lightly smeared with vaseline before introduction.

Under these conditions not only did the rubber adjust itself better to the contour of the canal, but the application of the vaseline afforded a twofold advantage, since it made it possible to distinguish readily between the two surfaces of the rubber strip, the one being smooth and shiny and the other retaining its original dull appearance; since the vaseline side also was the one brought into contact with the skin the slipperiness of the surface permitted its much more complete adjustment by gentle pressure of the

probe or with the closed forceps, and a further advantage was found to accrue, in that the absorption of the vaseline producing a partial vacuum beneath the rubber resulted in so close an adherence of the latter to the skin, that the beneficial effects of the spring were of much longer duration, and in some subsequent instances it was found on the removal of the rubber that a thin layer of exfoliated epidermis was adherent to it.

In the case in question after three or four applications of the rubber spring, extending over a period of about six weeks, the improvement in hearing remained without the application, which was repeated, however, once again during the subsequent year.

A consideration of the angle at which the plane of surface of the membrana tympani is set to the long axis of the external canal, and of the adjustment of the rubber strip, one end of which rests upon the anterior wall of the canal directly opposite the presenting surface of the short process of the malleus, shows that the pressure exerted by an elastic substance thus placed, would be directly in the line which would favor the most complete apposition of the malleo-incudal articulating surfaces with reference to the transmission of mechanical movement from the first to the second bone, and would, moreover, by counterfeiting in a measure from without the effect of muscular traction from within, favor that action of counterbalance in the preponderating weight of the ossicula above the axial line of vibration which is most favorable to the transmission of short sound-waves falling upon the membrana tympani below.¹

Of the various effects of abnormalities of tension of the sound-transmitting apparatus, those which show themselves by changes in the voice of the patient are often most instructive, and when these occur in the singing voice the

¹ The above observations are in accordance with the theory of Knapp, concerning the mode of action of the artificial membrana tympani, communicated verbally to Politzer and mentioned by him in his text-book on diseases of the ear.

Politzer himself found that the cases where the artificial membrane effected an improvement in hearing moderate pressure with a blunt probe on the short process had the same effect, while in other cases it was necessary to make the pressure lower down upon the handle of the malleus.

subject becomes one of very great importance to the individual and worthy of painstaking search as to a possible remedy.

Since the modulation of the voice is governed more or less by our sense of hearing, and since the tympanic cavity and membrana tympani represent a certain individual pitch in vibration, and since this particular tone lies always rather within the limits of the upper than of the middle or lower register of the singing voice, it stands to reason and may even be stated as a recognized fact, that the production of tones in the upper register of any singing voice is especially affected by the tension of the transmitting portion of the auditory apparatus.

Changes in the tension of this apparatus might therefore be expected to act reflexly as it were upon the production of the voice tone, an effect which could be more or less compensated for by changes of method in production, involving a certain degree of effort; it would be expected also that the change most likely to have a disastrous effect upon the appreciation of, and therefore the production of the qualitative over-tones would be a decrease in tension, on relaxation, of the whole or a part of the sound-transmitting apparatus. And this has been shown to be the case in instances where relaxation of the membrana tympani, more especially of its posterior segment, has been accompanied by an unfortunate tendency to flat in those notes the qualitative over-tones of which might be supposed to correspond to the individual tone of the membrana tympani. Of this the following case is an illustration:

Mrs. X., soprano, who had sung successfully in public for several years, suddenly found herself flatting on F and F# in her upper register. This tendency to flat continued despite vocal efforts to correct it, but was temporarily relieved by Valsalvian inflation, the duration of the improvement so effected becoming gradually shorter and shorter, until it was no longer of value for more than a few minutes at a time.

Examination showed a slight naso-pharyngeal catarrh, some swelling of the tubal mucous membrane, and both membranæ tympani, especially the right, moving freely on Valsalvian infla-

tion, and showing, moreover, some stretching of the posterior segments of the membranes.

The hearing was rather more impaired in proportion for high, than for low tones, and there was slight circulatory tinnitus in both ears. Valsalvian inflation increased the hearing for high tones and proportionately decreased the tinnitus. In running the scale with the voice there was a perceptible flattening at F F# the tone being given without clearness and brilliancy.¹

Application of the rubber strip in the same manner as described in the previous case, gave immediate and interesting results. The tinnitus aurium decreased, the hearing for low tones remained about the same, and was only slightly improved for high tones, but the voice was decidedly and beneficially affected, so that the patient was able to sing in public on the following day.

In this case, the repeated closure of the Eustachian tubes consequent upon the continued post-nasal catarrh with the corresponding rarefaction of air in the middle ear alternating with condensation incident to the Valsalvian inflation, had produced a stretching not only of the membrana tympani and the muscle, but also of the malleo-incudal capsular ligament and the conjoint attachments.

The rubber spring pressing as in the former case served to restore the apposition of the malleo-incudal articulating surfaces, and to support in a measure also the relaxed membrane; it remained in place satisfactorily for a period of ten days and was then renewed with equally good results.

A third application, however, was not so efficacious, and it was therefore inferred that the rubber having effected its purpose, the remaining disability was due rather to the relaxed condition of the membrana tympani in its posterior portion, and the treatment was continued by the application of paper disks to this surface. The paper dressing was also found to serve the practical purpose of restoring the quali-

¹ The point of transition from the medium (or mouth vibration) to the head tones seemed to be the first affected, the tones F F# being flat, and all tones above still more so, until at the end of a scale the voice was invariably half a tone flat, while to compensate for this it was necessary to resort to a forced effort in producing the tones, which over-exertion had finally produced its inevitable result of voice strain.

tative value of the voice, this improvement lasting from periods of from three to ten weeks, a repetition of the rubber application not having been required.

In this case, a more frequent or a continuous use of the paper, following upon the rubber application, would probably have had a more permanent result.

The effect of relaxation of the sound-transmitting apparatus upon the transmission of sound from within outward is further illustrated by those cases of circulatory tinnitus in which the subjective noise becomes sometimes so annoying as to prove of greater detriment to the patient than the corresponding loss of hearing for sounds from without.

The following case may be given as an instance of this kind.

A gentleman, thirty-six years of age, of intellectual pursuits, and a public speaker, began, two years before his first visit, to have circulatory tinnitus in the left ear; this had gradually increased, both in volume and in variety, until to the simple continuous high-pitched sound there was added the deeper tone and the pulsation of the larger vessels.

The resultant compound noise had become so troublesome as to seriously interfere with his ordinary mental work, and the occasional relief afforded by forcible Valsalvian inflation was becoming less and less to be depended upon.

An examination of the left ear showed a considerable thickening of the tympanic coat of the membrana tympani, and inflation of the middle ear gave a very decided excursion both of the malleus and membrane, while the maintenance of the pressure in the middle ear decreased the tinnitus aurium.

This favorable effect was also brought about by the application of the rubber strip, and continued several weeks, at the end of which time reapplication was necessary.

This favorable effect was also brought about by the application of the rubber strip, and continued several weeks, at the end of which time reapplication was necessary.

It should be especially noted, in dealing with cases of which the foregoing are examples, that the treatment consisting merely in the application of well-recognized surgical rules modified to meet the peculiar contingencies presented

should be apportioned to the delicacy of the apparatus with which it has to deal ; and furthermore, that while the immediate result may be eminently satisfactory, the treatment must be long-continued to get any permanent result in a condition which has become essentially chronic by the time it is brought to the attention of the surgeon.

Still further, it should be said, that the adjustment of such mechanical appliances must always be a matter of more or less experiment, since the questions of the weight and position of, and the degree of pressure exercised by, the dressing are variable factors which must be apportioned to the individual needs of the case under consideration.

The fact therefore that the application does not give immediate relief by no means justifies the conclusion that it cannot be of service, since the effect may either follow later or may be more immediately brought about by slight change in adjustment.

A CASE OF PRIMARY LABYRINTH NECROSIS WITH FACIAL PARALYSIS.

BY MAX TOEPLITZ, NEW YORK.

(With two drawings.)

M. K., aged six and a half years, was seized toward the middle of April, 1889, with a severe attack of scarlatina associated with an exanthema of a week's duration and slight throat affection. On May 6th the mother noticed that the face was drawn to the right side, especially in laughing, and that the child could not close the left eye. A few days later her attention was drawn to a profuse purulent discharge from the left ear. For five weeks the girl was confined to bed, and she could not stand on her feet after the termination of the disease. She had to learn walking anew, which took her over three weeks. In the beginning she was in danger to fall at the slightest movement. On June 17, 1889, nine weeks after the first appearance of the affection, the patient presented herself at the N. Y. Ophthalmic and Aural Institute, and the attending aurist (Dr. McMahon) diagnosed left facial paralysis, aural polypi (?), caries of promontory (?), and removed several polypi on the same day. Later on he has repeatedly removed polypi with the sharp spoon, during which operations several small, shapeless particles of bone were discharged. Profuse otorrhœa persisted and polypoid granulations formed continually. Since the beginning of the affection the patient had not complained of pain or tinnitus.

On January 29, 1891, the patient came under my observation in my service at the N. Y. Ophthalmic and Aural Institute. The facial paralysis could not be noticed when the facial muscles were at rest; in laughing, however, the face was drawn to the right.

I found the left external meatus to be filled with polypi and removed several, on the day of the patient's first presentation, with the cold snare. On February 26th and on April 3d some more polypi were removed. The granulations reappeared abundantly in spite of the use of the sharp spoon and chromic acid. In the beginning of June on probing I noticed a firm resistance in the external auditory meatus, which gave the impression of rough bone. An attempt at removal with the sharp spoon failed on account of intense pain and of the sequestrum being firmly wedged in the osseous meatus.

On July 9th the sequestrum (cp. Fig. 1) had loosened itself so as to permit its removal with the cold snare, whereby intense pain was caused through its sharp edges. Two days previous to the removal the patient complained for the first time of continuous pain, which lasted until after



FIG. 2.

FIG. 1.

the removal of the sequestrum. Otorrhœa still continued and polypi occurred, although sparsely.

On August 6, 1891, another resistance was discovered in the external meatus and immediately removed with the spoon in narcosis (cp. Fig. 2).

Since August 7, 1891, the otorrhœa and polypi had permanently disappeared. The two sequestra belong to the petrous portion of the temporal bone—viz., both are portions of the cochlea.

The sequestrum, which was first removed (Fig. 1), is about $\frac{9}{16}$ " long, and $\frac{1}{4}$ " wide; it is perforated by a wellnigh round opening, from which a curved sulcus emanates, the curvature corresponding to one fourth of a circle.

The second, smaller sequestrum, is $\frac{5}{16}$ " long and $\frac{1}{4}$ " wide, with two openings which end in two curved tubes running toward each other.

The two sequestra can be exactly attached to each other at the eroded places.

The electric examination kindly made by Dr. Barney Sachs at my request on December 31, 1891, had the following result :

There exist but the remnants of a paralysis of all branches of the left facial nerve. The angle of the mouth is drawn only in exertions and in laughing. No deviation of the uvula. The electric reactions have also become nearly normal. The nerve is excitable by strong faradic currents, but, of course, not by far to such an extent as the healthy facial.

The left facial responds to very strong galvanic irritation (first Kath. Clos. at 6 M. A.), whilst the muscles react to less strong currents (orbicularis oris, first K. C. at 6 M. A., first A. C. at 8 M. A. On the right side the first K. C. can be reached at 3.5 M. A.). Hence follows that there exists but a slight indication of the former disturbance of electric reaction. No degenerative reaction was present on the day of examination. Complete recovery is to be expected within a brief period."

The patient states at the *examination of hearing* that she hears on the left ear the high and low tuning-fork through air-conduction as well as through bone-conduction; on the other hand, she hears also the tuning-fork, placed upon the *right mastoid process*, in the *left* ear only, even when the right ear is closed. It can, however, hardly be supposed that she still perceives with the left ear, since exact localization must be excluded in the very young patient, and the statement of perception in the left ear of the tuning-fork, when placed upon the normal ear, contradicts all physiological laws.

The voice is heard only when spoken very loud into the affected ear, and here also the perception of the right, though closed, ear cannot be excluded.

Otосcopy of the left ear reveals that the tympanic cavity is covered with a delicate scar, which must be considered as pseudo-membrana tympani.

The literature on labyrinthine necrosis has been collated by Bezold up to the year 1886 in vol. xvi. of these

ARCHIVES. Since then about twenty cases have been published, a synopsis of which I shall publish in the next number of these ARCHIVES.

In the greater number of observations the necrosing process develops but secondarily in the course of suppuration of the middle ear.

The following three cases are an exception to the rule :

1. In Christinne's¹ case, observed at Schwartze's polyclinic, the otorrhœa had lasted but two months before the appearance of the necrotic cochlea in the external auditory meatus. The patient was seized with sudden vertigo and fatigue, with pain in the right hemicranium, and vomiting of three days' duration. No loss of consciousness. After twelve weeks otorrhœa took place, with immediate abatement of the pain ; a week later facial paralysis.

2. In Trautmann's² case the patient, aged forty-five, took ill with meningitic symptoms. Six weeks later, otorrhœa with granulations, after the removal of which the necrotic cochlea was extracted. Cicatrization. After nine months, formation of cholesteatoma. Operation. Recovery with facial paralysis.

3. In my own observation, as described above, the labyrinth was affected from the very beginning. The facial paralysis, as initial symptom with subsequent otorrhœa and simultaneous disturbances of the equilibrium, positively indicate a primary lesion. The further course of the case was, it is true, quite slow.

We must therefore in these three cases suppose a *primary* inflammation of the labyrinth ending in necrosis.

¹ Christinne, *Arch. f. Ohrenheilk.*, vol. xviii., p. 293.

² Trautmann, Meeting of German Naturalists at Berlin. Section of Otology.

CEREBRAL ABSCESS AFTER OTITIS MEDIA ACUTA HEALED BY OPERATION.

By DR. C. TRUCKENBROD, OF HAMBURG.

Translated by Dr. J. A. SPALDING, Portland, Me.

April 8, 1891.—Mr. H., aged fifty-four, consulted me for a deafness and tinnitus of the left ear which he had perceived for the last ten days. He was very anxious about his hearing, as that of his right ear had been very poor for years (sclerosis). I diagnosticated an exudation in the left tympanum, and expressed a very favorable opinion. At a later date he recollected that the good ear began to suffer soon after the influenza. All inflammatory symptoms, such as pain, feverishness, vertigo, etc., were entirely absent. Having failed to remove the exudation by the aid of catheter and injections of iodine, I made a paracentesis of the *Mt* on April 20th, removed a large amount of serum, and on the next following days I removed still more by inflating the tube with the catheter. About the end of the month he had a furuncle in the meatus, probably due to an excoriation arising from a bit of cotton wedged too tightly in the meatus. The secretion gradually became purulent, but he still felt perfectly well. On the 2d of May while in a profuse perspiration, he ran around the corner of the street and was suddenly exposed to a violent cold wind, so that he at once perceived pain in his ear and head. Arriving home he at once took to his bed, and passed a restless night with feverishness and pain in the head. His physician directed antipyrine, on account of a temperature of 104° .

May 5th.—Consultation : pain in head ; perforation in *Mt* very small ; it was at once enlarged ; secretion abundant, creamy, and violently pulsating.

May 9th.—Perforation having contracted, was again enlarged ; violent parietal pain ; vertigo on attempting to stand, or on moving head ; no vomiting, anæsthesia, or visual disturbances. His constant complaint was of the violent temporal pain. "There is something here ; I shall not get well till that is out of the way," was his repeated remark.

May 13th.—Slight paralysis of the right facial ; the patient became very garrulous, and stumbled over his words, calling Night Day, and Summer Winter, and everybody was "Thou." He could not find words for ordinary things like spoons and forks, but to suggestive questions he invariably gave correct answers. He was very cross because he was unable to think of the proper words, delighted when he could think of them, yet gradually sinking into an apathetic condition. Bodily temperature the same on both sides ; no anæsthesia, no vertigo, no vomiting, and temperature not higher than 100° or 101° . Pupils and fundi normal, so too the mobility of the eyes. Dyslexia ; very excitable ; anarithmia ; could not count further than 1, 2, 3, but he saw and recognized everybody, had no diplopia, and with each eye alone, carefully tested, he saw as well as any one. Paresis of right arm.

The diagnosis of some cerebral disturbance was clear, but whether cerebral abscess, œdema, or epidural abscess it was not easy to say. Meningitis seemed improbable. We suspected from the symptoms on the part of the right facial, the right arm, and the disturbances of speech, an affection near the left temporal and parietal lobe, and that affection probably an abscess.

A consultation with the family physician and another found this opinion confirmed. We decided to watch the patient carefully, to wait patiently for the pus, if present, to thicken, and on the appearance of threatening symptoms to operate at once. It is well worth observing at this point, that at no time during the entire course of the affection was any alteration visible about the mastoid process. The only constant symptom was the violent parietal pain.

May 17th.—Sopor. Patient hardly speaks all day long. Temperature 103° .

Longer waiting appearing dangerous and aimless, we decided

to request Dr. Schede to perform the operation, which he agreed to do at once on seeing the patient for the first time on the 18th. He agreed with the probability of an abscess, and advised that first the mastoid should be extensively opened.

Under chloroform narcosis and with all antiseptic precautions, the mastoid was opened in the usual way. There was no trace of exudation or pus, but occasionally some caseous otitis. Nor was there any fistula or alteration in the roof of the mastoid. Nevertheless the roof was opened with the chisel, and the dura laid bare. No trace of pus being seen, the dura was divided and the brain exposed. This was very tense, but there was no pulsation or pus, although extremely hyperæmic. Exploratory puncture forward and upward with a delicate needle and syringe evacuated pus and a bright liquid to the amount of sixty grm. It was more probable that the pus in the abscess had decomposed than that the bright liquid had escaped from one of the ventricles. The orifice made by the needle was enlarged with a knife, and a drainage tube inserted. The cavity in the bone and the abscess cavity were thoroughly irrigated with sublimate (1 to 1000), the wound covered with iodoform, and antiseptic gauze laid over all.

The recovery was excellent. The feverishness, the facial paralysis, the paresis of the arm, and the intense pain disappeared at once. A day or two later the drainage tube becoming clogged, the patient's condition deteriorated rapidly, but this being removed and a larger tube inserted the rest of the recovery was ideal. By July the cicatrix was closed, the discharge from the meatus had disappeared, the perforation in the *Mt* had nearly cicatrized, and the hearing was as good as before the attack. The mental functions returned even faster, for whilst the patient's handwriting on the 2d of June had been almost indecipherable, it became legible in ten days, and in three more days he wrote long letters with ease. The only trace of the serious condition through which he has passed is visible in the quick and frequent exhaustion following a very slight amount of work.

LITERATURE.

Since I reported with Schede¹ the first permanently successful case of cerebral abscess cured by an operation, others have followed in rapid succession. First we find eight cases

¹ These ARCHIVES, vol. xv., p. 176.

by v. Bergmann¹ whose experience in cerebral surgery is so well known, and three by Braun,² two of them being from older literature and one by Schwartz. Next we discover one by Sick,³ two additional cases by Pritchard,⁴ a case of cerebellar otitic abscess reported by McEwen,⁵ and finally a case by Hoffman,⁶ the introduction of which at this place may however be doubtful, because he did not set out with the intention of opening a cerebellar abscess, though such a one was accidentally opened during the operation and with the most grateful results.

Therefore we have at present a list of seventeen successful operations for the relief of otitic cerebral abscess. And I should not omit to give all praise to Schede for having been the first to decide that it is proper and necessary and scientifically accurate to operate for an abscess so situated, and to accomplish the operation successfully in all its details.

OTITIS ACUTA.

Our case is interesting from another point of view, for v. Bergmann once said that the diagnosis is made by recalling to mind the previous suppuration; in other words, the chronicity of the case decides the presence of an abscess. But in a later edition of his monograph he suggests that cerebral abscess may originate after *acute suppuration* in the interior of the ear, mentioning cases by Schmidt and Gruber. Now, our case is one of that sort, and really the only one yet reported except a single one by Schwartz, in which the operation has been done with success after otitis acuta.

DIAGNOSIS OF THE LOCALITY OF THE BRAIN DISEASE.

The chief diagnostic point is the aphasia, which according to Wernicke indicates a disturbance in the posterior third of the first left temporal convolution of the brain. Hence we as-

¹ "Die chirurg. Behandlung von Hirnkrankheiten."

² "Die Erfolge von Trepanation bei dem otitischen Hirnabscess,"—*Archiv f. Ohrenheilk.*, xxix., p. 161.

³ "Aphasie durch Gehirnabscess. Trepanation. Heilung." Saenger und Sick.—*Deutsche med. Wochenschr.*, 1890, p. 186.

⁴ These ARCHIVES, vol. xix., p. 149.

⁵ These ARCHIVES, vol. xviii., p. 217.

⁶ "Beiträge zur Hirnchirurgie,"—*Deutsche med. Wochenschr.*, 1890, p. 1082.

sumed that the abscess was situated in the temporal lobe. Additionally we had the circumscribed pain in that region, throughout the entire course of the attack. The paresis of the right facial, the convulsions in the right arm, and the weakness of the right hand in contradistinction with that of the left, aided the correct diagnosis.

v. Bergmann has called attention to the fact that in cases of abscess in the temporal lobe we must remember, in addition to a general increase in pressure caused by increased tension of the cerebro-spinal fluid in the entire cranial cavity, that pressure is further propagated by the brain itself, and unevenly, so that those portions of the brain near the temporal lobe are more affected than those lying at a distance.

This increased pressure in the skull also explains the agraphia, anarithmia, and dyslexia as observed in our case. But all in all, the most weighty symptom was the *aphasia so evidently suggesting the left temporal lobe as the one affected*.

THE SIZE OF THE ABSCESS can only be guessed at in these patients, and even with large abscesses, as proved at the autopsy, the patients have often suffered but little during life, the chief point being the amount of gray substance affected. Even with large abscesses the tracts often remain open and are only broadened by pressure. v. Bergmann.¹

Moreover, since in Koerner's opinion² left-sided otitic cerebral abscess is rarer than right-sided, then, in case of doubt, the aphasia is a very important diagnostic point. Besides that, the autopsy has revealed in some patients a cerebral abscess on *the side that was apparently unaffected*.³

The diagnosis between circumscribed meningitis or some other affection in the neighborhood of the fossa Sylvii, can rarely be determined with certainty, and only occasionally by the absence of other cardinal symptoms.

¹ Ziemssen's Handbuch, Band xi., p. 2.

² Archiv f. Ohrenheilk., vol. XXIX., p. 25.

³ For general views on the so-called otitic cerebral abscess, see a dissertation by Custer, Bern, 1880; Troeltsch, Archiv f. Ohrenheilk., Band iv., p. 105; Rudolph Meyer, "Die Pathologie des Hirnabscesses," p. 26; and Robin, "Des affections cérébrales consécutives aux lésions non-traumatiques du rocher, et de l'appareil auditif," Paris, 1883, where at page 36 five cases are cited.

THE OPERATION.

Chauvel, v. Bergmann, and v. Wagner have laid down the rules for the operation on cerebral abscesses in the temporal lobe, the first of which is the opening of the mastoid process, having in mind the fact that it is often affected in ear diseases. We may then find, for instance, caries or necrosis of the tegmen, or even a fistula, showing where the pus entered the skull, and giving a road to enter by. Although the mastoid was opened in our case, and no disease discovered, yet there were traces of former disturbances. The next step varied from the one generally advised in that, instead of enlarging the exterior incision, we chiselled away the tegmen. Next the dura and membranes were divided, the brain punctured, and, after pus was revealed, the brain was pierced with the knife up to the cavity, the exploratory syringe being used as a guide. The reaction that occasionally follows suction with the syringe has suggested to the most recent operators to abandon this instrument and to enter the brain boldly with the knife, as the dangers are but slight.

Experience alone can tell whether after all it is best to seek for temporal abscesses directly from the roof of the mastoid process. At all events it offers the advantage of leaving the entrance of the wound lower than the abscess, so that the pus flows off easier and the skull is not injured, something very advantageous to the patient.

DRAINAGE can be best accomplished with as broad a tube as possible, and perhaps it would be wiser to have one that is hard and unyielding, like silver.

If one has a good clinique and attendants the aurist ought to be able to operate as well as any one, but in private practice, where skilled attendants are rare, it may be best on the whole to summon the attendance of a skilful surgeon for the operation to be performed.

The RESULT in our case, with complete cicatrization of the mastoid and the closure of the perforation in the *Mt* and good hearing, must be considered ideal. The otorrhœa persisted in some of the cases that have been reported, and v. Bergmann cured the same by a method suggested by Kuester, which is, however, rather dangerous to undertake.

In conclusion, let us not forget the words of v. Bergmann : "Whoever knows as we do that there is no other termination to cerebral suppuration than a fatal outbreak into the ventricles, or equally fatal meningitis, must look upon the surgical opening of cerebral abscesses as the rescue from an urgent danger to life." And Sahli¹ has lately remarked : "Surgery has a more favorable future in brain abscesses than in case of brain tumors. In this province much has already been done, and with increased refinement in diagnosis much more remains to be accomplished."

I will now venture to add

brief notes of two other similar cases

in which, although the operation was properly performed, the results were unfavorable.

CASE I.—Man, aged twenty-nine. Suppuration from left mastoid ; abscess of left temporal lobe ; trepanation ; drainage ; rupture of the abscess into the ventricle ; death from meningitis.

Pain over the mastoid. Pain began three months before, but only occasionally. Present inflammation began December 23d with pain in neck and head ; temp. 103° , pulse 92 ; left *Mt* much injected but not much bulged forward.

On the following days spontaneous perforation of the *Mt*, violent pain in ear and head, no cerebral nerves affected, pain on mastoid-pressure, but no swelling.

December 30th.—The mastoid was chiselled open, and much pus liberated ; the transverse sinus could be seen in the bottom of the incision ; iodoform and salicylated-water injection into the meatus.

January 6th.—Violent pain in temporal region ; no congestion-papilla ; no vomiting ; strabismus divergence left eye ; patient dull and apathetic to questions.

January 11th.—Pulse 55, temp. 99° ; very restless ; ptosis of left upper eyelid ; loss of sensibility over lower extremities ; patellar reflex painful ; congestion-papilla in each eye ; diagnosis, probably cerebral abscess.

On the same day trepanation of the left temporal and parietal bone according to Wagner's method. A piece of skin and bone about 6 cm in diameter was tilted upward. Dura enormously

¹ "Über chirurgische Operationen vom Standpunkte der inneren Medicin," *Volkmann's Hefte*, Neue Folge, Band xxviii., July, 1891.

tense, but no pulsation; incision in dura, with puncture of the temporal lobe of the brain. A great deal of cerebro-spinal fluid and pus was evacuated. Iodoform into the abscess cavity; tegmen tympani apparently intact. The osseous flap replaced and a bandage applied.

The following day the pulse and temperature were more nearly normal, the patient clearer-headed, the strabismus and ptosis hardly noticeable, and all the symptoms more favorable. The bandages were changed from time to time.

Three days later the patient became rapidly worse. The bone was removed as soon as possible, and a second puncture of the brain made with a knife, but without giving passage to pus or other secretion from the abscess cavity. The ocular symptoms all returned even more noticeably than before, the sensibility of the cornea being remarkably low.

Without entering into all the long story of the symptoms varying from day to day, we may say that, in spite of repeated opening of the wound, of various antiseptics and internal medication, the patient's condition grew worse day by day, and he gradually fell into a comatose condition and departed on the 25th of the month, fourteen days after the operation.

AUTOPSY.

Body well developed; extreme cadaveric rigidity.

Brain substance falling through the round orifice in the bone. On removing this the pia and rest of the brain in the lower angle appear normal. Dura very dense, pia thickened, a thick layer of pus at the chiasma, and the nerves of the right side more deeply imbedded in the pus than those on the left side; the lateral ventricles filled with purulent secretion.

The part of the brain prolapsed belongs to the first and second left temporal convolutions. On uncovering the abscess cavity it is found to be very extensive, reaching out to the posterior lobe.

Nothing macroscopically abnormal in the rest of the cranial organs, the cerebellum being a little flattened, and the substance softened. The organs of the thorax and abdomen were nearly normal, the right lung alone being somewhat infiltrated in the lower lobe.

CASE 2.—*Otitis media; mastoiditis; cerebral abscess; death.*

R. H., a baker, aged twenty-five.

September, 1886.—Pain for the last week in the left ear, with

abundant suppuration. Later he informed us that he had been deaf and had suffered with a discharge from this ear for about a fortnight, and that the discharge had once ceased, then reappeared. Vomiting in the last two days; voice, close to the ear; mastoid tender; nothing to see in the swollen meatus.

Three days later, temp. 101°; loss of consciousness at times; mastoid incision, and then the chisel; pus only discovered at a great depth; excessive hemorrhage; bandage; iodoform.

Within twenty-four hours the patient was again fully conscious and his temperature normal.

The breathing ceased on the following day as the bandage was being changed; artificial respiration necessitated, and was successful; pulse good. Thinking that pressure on the brain had caused the respiration to stop, the mastoid incision was enlarged and the dura laid bare with the chisel, but no pulsation. Cheesy otitis. The exploratory needle after being introduced several times in different directions finally gave exit to two teaspoonfuls of fetid pus when pushed upward and backward. During the entire time of the operation artificial respiration was kept up; this was for more than two hours. When the dura was exposed the respiration returned. The respiration ceased again after the patient had been half an hour removed from the operating table, and artificial respiration was again necessary. Injections of ether; wine and egg by the mouth.

On the following morning the condition of the patient grew slowly worse, and although he regained consciousness once or twice he did not rally, but passed away on the afternoon of the 18th, a week after his entrance to the hospital.

The autopsy showed the heart and lungs and all of the abdominal organs to be healthy. The drainage tube left after the operation passes through the posterior lobe of the brain as far as the tentorium, but not through it. The left cerebellum contains a small cavity filled with offensive greenish pus. Surrounding it are small hemorrhages and softening. The discoloration and softening extend across the middle line. Dura equally affected; brain of natural consistency. The left transverse sinus contains a firm red thrombus, which is softened in its upper portion and behind the sulcus, and in the sulcus itself is a layer of greenish discolored pus. Cheesy otitis in the mastoid and the middle ear extending through the tegmen tympani. The sinus longitudinalis is free from thrombi.

REPORT ON THE PROGRESS OF OTOLOGY DURING THE FIRST HALF OF THE YEAR 1891.

BY PROF. A. BARTH AND A. HARTMANN.

Translated by Dr. MAX TOEPLITZ, NEW YORK.

A.—NORMAL AND PATHOLOGICAL ANATOMY, HISTOLOGY,
AND PHYSIOLOGY OF THE EAR AND NASO-PHARYNX.

BY A. BARTH, MARBURG.

I.—ANATOMY.

a.—HEARING ORGAN.

1. HAUG, R. (Munich). The best methods of decalcification. A technico-histological sketch. *Zeitschr. f. wissenschaftl. Microscopie und für microsc. Technik*, 1891, vol. vii., p. 1.

2. RANDALL, B. A. The corrosive method in the study of the anatomy of the ear. *The Amer. Journ. of Med. Sci.*, 1891, vol. ci., No. 1.

3. BOUCHET, R. Anatomy of the elephant's ear. *The American Lancet*, April, 1891.

4. EVLE, PETRONA (Buenos Ayres). Malformations of the auricle. *Inaugural Dissertation at the University of Zurich*, 1891. Zurich, Institute Orell Füssli. With 4 plates.

5. VÁLI, ERNST. The morphological alterations of the auricle in the normal, insane, and idiot. *Allgem. Wien. med. Zeit.*, 1891, p. 121.

6. SCHWENDT, A. (Bâle). Congenital malformations of the hearing organ associated with branchiogenous cysts and fistulae. *Arch. f. Ohrenheilk.*, vol. xxx., p. 37, 1891.

7. LEWIS, A. PARK. A peculiar congenital ear anomaly. *Fistula auris congenita. Journ. Ophthalm., Otol., and Laryng.*, January, 1891.

8. HARTMANN, A. The opening of the cupular cavity. The anatomical relations in chiselling of the mastoid process as to possible injuries of the n. facialis and the labyrinth. Berlin, 1891, Fischer's *Verlags-Buchhandlung*, Atlas.

9. POLITZER, A. Cholesteatoma of the hearing organ from an anatomical and clinical point of view. *Wiener med. Wochenschr.*, 1891, Nos. 8-12.

10. AYERS, HOWARD, Director of the Lake Laboratory, Milwaukee. The membrana tectoria—what is it? and the membrana basilaris—what is its function? *Anat. Anzeiger*, 1891, p. 219.

11. HIS, W., Prof. Histogenesis and connection of the nervous elements. *Arch. f. Anat. u. Physiol.*, 1890, supplementary volume, p. 45 (very important paper—Moos).

12. HABERMANN. Hemorrhages into the labyrinth following pernicious anæmia. *Prag. med. Wochenschr.*, Sept. 24, 1891.

13. FERGUSON, JOHN. The auditory centre. *The Journ. of Anat. and Physiol.*, vol. xxv., new series, vol. v., 1891, p. 292.

14. LUYIS, I. Examination of the brains of two aphasic persons and one deaf-mute (Examen des cerveaux de deux aphasiques et d'une sourde-muette). *Comptes rend. hebdom. de la soc. de biol.*, série ix., vol. iii., No. 11, p. 188.

1. Decalcification readily takes place in phloro-glucin, whereby the tissues are well preserved. One gramme of phloro-glucin is heated slowly in a 10-per-cent. solution of pure non-fuming nitric acid, and shaken, whereby the nitrate salt of dark ruby color is formed. Up to 300 grammes of decalcifying fluid can be prepared with 1 gramme of phloro-glucin by the addition of distilled water; but it should always contain 20 per cent. of nitric acid, which may be increased to 35 per cent. in the case of very hard material. Thorough removal of the acid by running water, lasting about two days, is necessary in order to obtain permanent and well-stained specimens.

4. The material examined by Rohrer was derived from 3,000 histories of cases and from 100 inmates of the house of correction at Zurich. The results are as follows: The human auricle exhibits very frequent anomalies of formation which but in a few instances can be explained as to their mode of development.

The anomalies may be divided into (forms of) arrested development, excess of development, pigment anomalies, and hypergenesis. The anomalies and their excesses are frequently found as appearances of degeneration in the insane and in criminals as the expression of an early pathological disposition of the individual. They are of especial value in connection with other malformations for the comprehension of a deficient psychical disposition. They are, however, in this respect of no other import than the other malformations of the body. The connection of the malformations with psychical defect is at present unexplained.

6. SCHWENDT describes a bilateral microtism and defect of both external meatus, complicated with an external fistula situated in the right zygomatic region, and leading into a branchial cyst in a girl, 7 years old, with fairly good hearing power. He compares his case with previous publications of other authors.

9. After a general review of the prevailing views upon the question, POLITZER describes a series of specimens of cholesteatoma of the middle ear. I shall mention only one in which the masses had almost completely filled the osseous external meatus, the tympanic cavity, the anterior portion of the mastoid, and the entire labyrinth, and had also destroyed the facial nerve. Politzer distinguishes two groups according to their development, viz., primary and secondary cholesteatomata. In the latter group are comprised those in which the mucous membrane of the middle ear has become epidermis because of the continuity (produced by the perforation of the membrana tympani) between the investment of the middle ear and of the external meatus; the process is favored by stenosis of the Eustachian tube. He admits also the possible independent metaplastic transformation of the epithelium of the tympanic cavity into epidermoidal cells. Primary cholesteatomata are of rare occurrence. We may speak of primary cholesteatomata only when the mass projects into the tympanic cavity with a free, smooth, and iridescent surface, there being no destruction of the bone, and the membrana tympani being imperforate. It may also be considered as primary when it develops during the course of purulent otitis in the gland-like depressions, lined with epithelium, of the tympanic mucous membrane. Politzer considers cholesteatoma clinically as a retention mass, which leads by its growth, but principally by its easy disintegration, to very serious affections with symptoms of inflamma-

tion and retention. The paper marks a decided progress in our knowledge of cholesteatoma.

10. Corti's membrane is a product of shrinkage, swelling, and torsion, which originates from the hair cells supported by the cells of Corti's organ. It belongs to the same category as the cupulæ terminales. The membrana basilaris cannot be considered a vibratory membrane in the meaning of Heursen-Helmholtz. The vibrating endolymph rather strikes the hair cells directly. As a physiological unity the cochlea is a sensory epithelial cell with hairs; anatomically, however, the cochlea is a group of hair- and supporting cells, or a sense organ. The questions at issue will be more fully treated in a more extensive paper.

11. We emphasize the following points from this very important paper, on page 108: "The origin of the n. acusticus is to be looked for in the bipolar ganglionic cells of the cochlear and vestibular ganglia"; on p. 110: In the macula acustica of frogs of the same age the epithelial cells at the places reached by the nerves form a panel-work with membranous boundaries on either side. The nuclei are situated at the base. In the panels are round or pear-shaped cells which project with a long filament above the surface. This stage has been preceded by another in which clear formative cells with mitotic figures were imbedded between the densely packed epithelial cells.

Moos.

b.—NASO-PHARYNGEAL CAVITY.

1. HARTMANN, A. Atlas of the normal and pathological anatomy of the nose. Berlin, 1891. Fischer's *Verl. Buchhandlung*, 12 plates.

2. SUCHANNEK, H., Zurich. Pathologico-anatomical studies on rhinitis acuta, especially influenza rhinitis. *Monatsschr. f. Ohrenheilk.*, etc., 1891, p. 106.

3. MARANO, S., Naples. The nature of ozæna; historical and bacteriological investigations. *Arch. de laryngol., de rhinol.*, etc., vol. iii., p. 59.

4. STEPANOW, E. M., Moscow. The occurrence of the so-called "hyaline balls" in the tissue of mucous polypi of the nose, etc., with remarks on the hyaline bodies of rhinoscleroma. *Monatsschr. f. Ohrenheilk.*, etc., 1891, p. 134.

5. LUC. Contribution to the study of angiomata of the nasal fossæ. *Arch. de Laryng.*, December, 1890.

6. PILLIET, A. H. Notes on the erectile tissue of the nasal fossæ. *Bull. de la soc. anat. de Paris*, 1891, series v., vol. v., p. 209.

7. SCHMIEGELOW, E. A new bacterium of the mouth. Lecture delivered at the medical Society of Copenhagen, November 11, 1890. *Monatsschr. f. Ohrenheilk.*, etc., 1881, p. 102.

2. SUCHANNEK examined several cases of coryza morbillosa, of rhinitis acuta following pharyngo-laryngitis diphtheritica, and a typical case of influenza rhinitis. The chronic inflammatory conditions are characterized by the formation of bundles of connective tissue in the pars respiratoria of the lower and middle turbinated body, and of the nasal floor and septum, which push aside at places the glands and also the adenoid tissue; furthermore by metaplasia of the ciliated epithelium into cylindrical, transition, and tessellated epithelium. The hyperæmia and œdema are to be considered acute processes.

3. From the examination of the secretions of ten ozæna patients, one with atrophic and one with offensive hypersecretory rhinitis, and from experiments on animals, Marano arrives at the conclusion, that in ozæna a distinct micro-organism is constantly found, which does not appear in other forms of rhinitis, or elsewhere. It is furnished with a capsule, but is distinguished from other capsule cocci. It is identical with that described by Loewenberg. The cultures, like others, become offensive after several days; they do not, however, have the characteristic ozæna odor.

4. The hyaline bodies represent an ordinary condition in nasal polypi, adenoid vegetations, etc. They are at times much more numerous in polypi than in isolated cases of rhinoscleroma. They are therefore not of diagnostic value. Hyaline degeneration of the cells is probably an expression of the vis medicatrix naturæ, which protects the attacked organism against an unlimited increase of bacilli.

7. In the yellowish-white tonsillar deposit of a girl aged thirteen, Schmiegelow found a bacillus which in appearance and growth resembled the bacillus of glanders. It is pathogenic in mice, rabbits, and rats, apparently not so in chickens and pigeons. The author calls it bacillus anthracoides buccalis.

II.—PHYSIOLOGY.

HEARING ORGAN.

1. LARSEN, P. C., Copenhagen. Anatomico-physiological contribution to the study of the ossicula auditus. (Danish.)

2. BING, A. An analysis of Weber's experiment. *Wiener med. Presse*, 1891, Nos. 9 and 10.

3. CORRADI, C., Verona. The functional importance of the cochlea. *Arch. f. Ohrenheilk.*, 1891, vol. xxxii., p. 1.

4. LUMBROSO, G., and COEN, G. The electrical excitability of the acoustic nerve and its diagnostic value in affections of the cerebrum and of the nervous system in general. *Il segno, rivista mensile de semeiologia*, March, 1890 (rev. in *Neurolog. Centralbl.*, 1891, p. 110.)

5. QUINCKE, H. Associated sensations and allied conditions. *Zeitschr. f. klin. Med.*, vol. xxvii., 5.

1. Helmholtz, in his "Mechanism of the Ossicles and the Membrana Tympani," has pointed out, with reference to the ligam. externum mallei, that of its different fascicles the posterior is the strongest, and is most tensely stretched. The stretching of this ligament by the malleus affects, according to Helmholtz, the middle and strongest tracts of the ligam. anterior, which emanate from the spina tympanica major, and both bundles of fibres combined form the "axis ligament of the malleus." These conditions are somewhat different, according to LARSEN. Elongation of the posterior and strongest fascicle of the ligam. extern. mallei meets, "without exception," the inner wall of the cavitas tympani 1 mm anteriorly or posteriorly to the place where the tendon of the *m. tensor tympani* leaves the canal and turns around the proc. cochleariformis. According to Helmholtz, the stapes is not pulled by the incus in outward movements of the handle of the malleus. Larsen, with reference to this point, has carried out two series of experiments in corpses of individuals with normal hearing. He opened the cavitas tympani and vestibulum from above, so as to expose the stapedial plate from within. If the head of the malleus was moved laterally, the stapedial plate turned on its longitudinal axis, which corresponds approximately with the crista basos stapedis. He opened in addition the canal. semicir. super. at two places. A small glass tube was hermetically introduced into one opening, a stained fluid was then injected through the second opening into the inner ear, and the second opening closed. The membrana tympani is left intact, and the Eustachian tube permeable. If outward and inward movements are made with Siegle's otoscope, the fluid rises and falls regularly in the glass tube, thus indicating a corresponding piston-movement of the stapes, since with a patent Eustachian tube a movement of the

membrana fenestræ rotundæ is to be excluded. These experiments make it appear probable that in certain affections the mobility of the stapedial plate may be entirely or partially restored.

V. UCHERMANN.

2. BING analyzes Weber's experiment in disturbances of conduction of sound and in nervous diseases, and in the two together, and rightly advocates its usefulness for the examination of the ear.

3. CORRADI has destroyed the cochleæ of forty guinea-pigs, unilaterally and bilaterally, partially and completely, and has arrived at the following conclusions: 1. After complete destruction of both cochleæ, complete and permanent deafness results. 2. Partial destruction causes in some cases complete deafness. There remains, however, frequently a certain degree of hearing power, or it returns after some time. 3. It is quite probable that the lower notes are perceived at the cupola, the higher notes at the base of the cochlea. Corradi finally adds some remarks upon the value of Weber's experiment. The author rightly emphasizes that the solution of the question involves great difficulties, and even his own experiments admit of many exceptions (Reviewer).

4. The authors, on account of their own observations, deny the diagnostic value which some investigators, principally Gradenigo, have attributed to the electric reaction of the acoustic nerve for the diagnosis of intracranial affections. On the other hand, they think more favorably of the therapeutic value of the electric treatment of the acoustic than Gradenigo.

B.—PATHOLOGY AND THERAPEUTICS.

By A. HARTMANN, BERLIN.

a.—GENERAL LITERATURE.

1. KAYSER, R., Breslau. Report on the cases treated during the year 1890 in Professor Gottstein's private clinic for laryngeal, nasal, and aural diseases. *Monatsschr. f. Ohrenheilk.*, etc., 1891, Nos. 6 and 7.

2. HESSLER. Influenza otitis. *Arch. f. Ohrenheilk.*, vol. xxxii, p. 29.

3. HAUG. Lysol and naphthol in the treatment of aural affections. *München. med. Wochenschr.*, 1891, Nos. 11 and 12.

4. MENDOZA, F. SUAREZ DE, Angers. Colored hearing: A study of the secondary physiological false sensations, and particularly of the pseudo-sensations of colors associated with objective perceptions of the senses. Paris, D. Doin, 1890.

5. UCHERMANN, V., Christiania. Statistics of deaf-mutism in Norway. *Deutsche med. Wochenschr.*, 1891, No. 20.

6. LARSEN-UTKE, P. C., Copenhagen. Two autopsies on persons born deaf and dumb. *Nordiskt. med. Ark.*, vol. xxiii., No. 5.

1. KAYSER reports that during the year 1890, 1,893 persons were admitted to Gottstein's private polyclinic, among whom were 1,005 aural and 325 nasal patients. Among the former was a child, aged two and a half years, who had acquired a suppurative otitis from measles, with severe meningitic symptoms, followed by purulent pleuritis, the pus of which contained tubercle bacilli. The patient recovered completely under proper treatment. The mastoid process was chiselled in five instances according to Schwartze's method (one of them on account of cholesteatoma). In one patient the posterior wall of the antrum was found to be carious, and the sinus was laid bare. There existed in two cases a complication with facial paralysis, and in two others the operation was followed by erysipelas; two cases were cured, and three are still under treatment. In three patients with complete deafness the cause was in one instance a fall with fracture of the base of the skull, in another, lightning close to the patient, in the third measles. Adenoid vegetations were always removed with Gottstein's ring-knife, but in some cases of elderly individuals the snare introduced through the anterior nares with simultaneous introduction of the finger into the naso-pharynx was successfully applied. A girl, aged twelve, who had been asthmatic for seven years, was cured from her asthma by the operation. Ozæna was observed principally in the female sex, and in individuals of from five to twenty years of age. Kayser considers the rhinitis atrophicans of some authors an ozæna, which has run its course, since it occurs only at the later ages, which is in accordance with the reviewer's views. In addition, three cases of traumatic purulent perichondritis of the nasal septum may be mentioned, and thirty-two cases of nasal polypi (of which two with asthma), twelve of empyæma of the antrum,

five of which were operated from the lower nasal meatus, and one from the alveola. The nasal probe bent anteriorly like a hook, was of good service in the removal of foreign bodies, a method which has been practised by HARTMANN for a long time.

KILLIAN (Freiburg).

2. HESSLER observed forty-seven cases of otitis in influenza, among which the mastoid process was opened in twelve instances. This marked misproportion is explained by Hessler, by the fact that only severe cases were sent to him, while the general practitioners themselves treated the less severe ones. The operative cases are more fully described. Recovery took place in from two to seven weeks, with the exception of one case, in which death ensued on account of general tuberculosis, two months after the operation.

RÜMLER.

3. Lysol was used in otorrhœa by HAUG as irrigating fluid in a 0.25 to 0.1-per-cent. solution; stronger solutions produce pain. The odor is not pleasant. Lysol dissolved in spring water presents a milky appearance, making it impossible to judge of the removed discharges. The offensive odor of the secretions is readily destroyed. Lysol is of good service in removing cerumen and epithelial plugs. For the treatment of aspergillus it is about of the same value as other antimycotics. In acute inflammations of the external meatus, and of the tympanic cavity it relieves the pain very well, especially where slight epithelial exfoliation has taken place. Its action in the form of lysol-glycerin in 0.3 to 0.5-per-cent. solutions in acute inflammation of the tympanum was questionable, in some instances even unfavorable.

The author has used powdered naphthol in otorrhœa with such success as to bring the suppuration in from six to eighteen days to a mostly complete and definite standstill and to cure it, and that even in cases which had been treated without result with the usual remedies. In complicated otorrhœa it was unsuccessful. Haug lays stress upon the point, that the naphthol should be brought in contact only with the diseased parts; erythematous places in the external meatus become readily swollen and eczematous.

The author uses it as naphthol-alcohol (1.5 to 3.0 : 100.0 alcohol absol.) in thick mucous secretions and in perforations of the upper pole. It proved to be extremely efficacious in furunculosis, instillations being made from one to two times a day; the fluid remaining from two to five minutes in the external meatus.

JENS (Hanover).

4. SUAREZ DE MENDOZA gives a complete historical synopsis, reviews the present knowledge of the subject, and analyzes the different publications, to which he adds eight observations of his own. With reference to the origin of the affection, he shares the opinion of Chabaliér, who supposes a psychical disturbance approaching illusion, whilst Lussana, Rochat, and others consider it as a normal excitation of the sensory centres; Perroud considers the affection an association of ideas. In order to distinguish the five classes of secondary false sensations, the author introduces new names: pseudo-photesthesia, pseudo-acouesthesia, pseudo-phresesthesia, pseudo-gouesthesia, and pseudo-apsiesthesia, corresponding to the false sensations of sight, hearing, smell, taste, and touch. GELLÉ.

5. UCHERMANN found in Norway at the time of his investigation, 1826 deaf-mutes, 0.95 per cent. of the population, 1,028 males and 798 females. Congenital deaf-mutism existed in 51 per cent.; acquired, in 48.5 per cent.; eight were undetermined. A connection between congenital deaf-mutism and the geological condition, especially the drinking-water, could not be made out. In 50 per cent. of the cases the born deaf-mute had one or more congenital deaf-mutes among his relatives. In three cases only one parent was a congenital deaf-mute. We must refer to the original with reference to further details.

6. LARSEN-UTKE found complete or partial anchylosis of the stapelial plate in the right ear of two deaf-mute children (aged four and four and one half years) who had succumbed to diphtheria; in one specimen marked folds of the mucous membrane existed in addition.

b.—INSTRUMENTS AND METHODS OF EXAMINATION.

7. PROF. KIESSELBACH. Tuning-forks and experiments with tuning-forks. *Monatsschr. f. Ohrenheilk.*, 1891. Nos. 1 and 4.

8. GELLÉ. Semiotic value of pulsations established by the endoscope. *Ann. des malad. de l'oreille*, etc., September, 1891.

9. CHEVAL, Brussels. The electro-acoumeter. *Réunion des otolog. et laryngol. belges*, May 17, 1891.

10. ASCHENDORF. A new hearing-tube for hardness of hearing. *Berliner klin. Wochenschr.*, 1891, No. 17.

11. HAUG. A simple aural laryngeal and nasal manikin. *Berliner klin. Wochenschr.*, 1891, No. 2.

7. By clamping the tuning-forks, in order to deaden the upper tones, their qualities are altered in various ways, as *e. g.*, the pitch, which falls with the increasing weight and rises with equal weight by displacing the weights toward the base; furthermore, the time of vibration, which increases with the smaller weight and decreases with the larger one. The tone is loudest at the place of the weight. The weight increases the longitudinal vibrations in duration and intensity over the transverse ones. This is noteworthy, since the former are conducted to the labyrinth principally through the bone, the latter through the air. A critical discussion of the value of tuning-forks follows.

KILLIAN (Freiburg).

8. GELLÉ publishes a paper, based upon his own observations, some of which are briefly mentioned. He discusses the diagnostic value of the pulsations established with the endoscope. The latter consists, as it is well known, of a manometer glass tube, which is adapted to the external meatus, the calibre of the vertical limb being one fifth the thickness of the aural limb. It increases the excursions of the membrana tympani, and makes them visible by the movement of the column of the fluid. With this instrument the author has observed such cases, in which the objective signs did not suffice to make a diagnosis, or to explain the persistence or the return of subjective disturbances of hearing. The pulsations observed in these cases facilitated the diagnosis of the fluctuating character of the affection, and its seat in the tympanic cavity. On the other hand, the absence of these pulsations in another group of cases has assisted in confirming the purely nervous character of the throbbing felt by the patients. In most cases the drum-membrane was opaque, or the somewhat altered appearance did not admit of precision in the diagnosis of the local condition. The author sums up as follows: The endoscope may throw light upon the circulation of the tympanic cavity.

G. GELLÉ.

9. CHEVAL published last year a detailed description of his electro-acoumeter. He recommends it especially for examinations of unfitness for military service, where it will be undoubtedly of good service in exposing malingerers.

SCHIFFERS (Liège).

10. The instrument has two walls, which act as resonance sound-receivers. In his own case ASCHENDORF found his instrument to be far superior to similar ones of older construction, not

only on account of its intensifying the sound, but also by the absence of accessory noises, and its practicalness. The paper is illustrated with drawings. RUMLER.

11. The manikin constructed by the mechanic Eichenger at Munich is to be recommended, as far as can be judged from its description, and also on account of the moderate price of \$4.50. RUMLER.

C.—EXTERNAL EAR.

12. LEWIS, F. PARK. A peculiar congenital deformity; fistula auris congenita. *Journ. of Ophth., Otol., and Laryng.*, January, 1891.

13. VÁLL, ERNST. The morphological changes of the auricle in the normal, insane, and idiotic individual. *Allgem. Wiener med. Zeit.*, 1891, p. 121.

14. DELSTANCHE. Case of exostosis of the right external auditory meatus. *Réunion des otolog. et laryngol. belges*, May 17, 1891.

15. PHILLIPS, W. A. Atresia of the external auditory canal. *Journ. Ophth., Otol., and Laryng.*, April, 1891.

16. BAKER, CHAS. H. A case of spurious membrana tympani. *Medical News*, May 30, 1891.

17. SPRATLING, W. P. Aural hallucinations cured by removal of foreign bodies from the ear. *Medical Record*, January 13, 1891.

18. Prof. GRUBER. Operative removal of a foreign body which had entered the tympanum during unsuccessful attempts at extraction. *Monatsschr. f. Ohrenheilk.*, 1891, No. 5.

19. SCHMIDT, TH. Clinical communications. Foreign body in the external auditory meatus. *Münchener med. Wochenschr.*, 1891, No. 16.

20. LEWIS reports the occurrence of fistula auris congenita which he had observed in four generations, in fourteen individuals altogether. SWAN M. BURNETT.

21. Of normal and healthy individuals 26 per cent. of the males and 15 per cent. of the females have not a regular auricle; among the insane and idiotic, but one half presents a normal auricle. Complete or partial adhesion between the helix and anti-helix occurs in the latter twice, or even three times, as frequently

as in the normal; and also Darwin's macacus ear and Darwin's nodules, idiotic women excepted, in whom not a single macacus ear was observed by VÁLI. POLLAK.

14. DELSTANCHE's patient had felt four years previously in the right ear a hard tumor, which has caused neither pain nor disturbance of hearing. Two years later he experienced pain and slight discharge; these symptoms increased after a year. A hard, movable tumor existed posteriorly and upward. It was removed, and the patient's complaints soon disappeared entirely.

SCHIFFERS (Liège).

15. In PHILLIPS' case there was otit. med. suppur., with continual formation of polypi. These were removed from time to time, but finally, not having been under observation for some time, the patient appeared with the auditory canal completely filled with a polypus which was adherent all around and covered externally with integument. It was not interfered with.

SWAN M. BURNETT.

16. BAKER relates a case of purul. otitis med. chron., in which a false membrane had formed, about $\frac{1}{4}$ inch external to the position of the true membrane. It was thick, and crackled under pressure. It bled on being incised. A piece was excised and the edges of the wound cauterized, but in time the opening closed. An eyelet of hard rubber was then set in, and it has remained, giving the patient good hearing, and there is no discharge.

SWAN M. BURNETT.

17. SPRATLING relates a case where a man of twenty-eight was admitted to an asylum for the insane on account of "voices," and other aural hallucinations, which were insupportable. The hearing on the left side was reduced to watch at six inches. It was syringed, and a quantity of wax and pieces of tobacco were brought away. The "voices" left him in two days and he was discharged cured.

SWAN M. BURNETT.

18. A merchant, aged twenty-five, while scratching his left external auditory meatus with a pen-holder, left its broken-off end, consisting of a wooden ball, in the meatus. After several attempts at removal by different physicians, followed by inflammatory swelling of the entire meatus, had failed, GRUBER succeeded in removing the foreign body after chiselling off the posterior wall of the external auditory meatus. The ball had lodged in the posterior portion of the tympanic cavity. Recovery.

KALLIAN.

19. A peasant complained of hardness of hearing for six weeks. Diagnosis: ceruminal plug. With the syringe, besides cerumen, a cherry-pit was removed, which must have been lodged in the ear, according to the apparently authentic statement of the patient, for forty-seven or forty-eight years.

MÜLLER (Stuttgart).

d.—MIDDLE EAR.

20. Prof. MOOS, Heidelberg. The relation of micro-organisms to affections of the middle ear and their complications. *Deutsche med. Wochenschr.*, 1891, Nos. 11 and 12.

21. BOTT. Three cases of otitis media acuta with acute caries of the mastoid process, following measles. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 25.

22. BARCLAY, ROBERT. Abscess of the ear. *St. Louis Med. and Surg. Jour.*, January, 1891.

23. SEISS, R. W. The treatment of inflammation of the Eustachian tube. *Amer. Jour. Med. Science*, 1891, April.

24. DELSTANCHE, CHR. The use of liquid vaseline in middle-ear catarrhs. *Réunion des otolog et laryngol. belges*, May 17, 1891, Brussels.

25. SCHEIBE, ARNO. A new modification of the treatment with boric acid in ordinary chronic suppuration of the middle ear. *Münch. med. Wochenschr.*, 1891, No. 14.

26. LINNELL, E. H. Boroglyceride in otitis media suppurativa. *Jour. Ophth., Otol., and Laryngol.*, April, 1891.

27. JAENICKE. The boric acid treatment in chronic suppurations of the middle ear, with a report on a new preparation of boric acid. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 15.

28. Prof. JOS. GRUBER, Vienna. Contribution to the treatment of chronic purulent inflammation of the middle ear, with perforation of Shrapnell's membrane. *Allgem. Wiener med. Zeitung*, 1891, Nos. 1 and 2.

29. LUC. Recoveries from chronic suppuration of the tympanum following the excision of the malleus. *Bul. soc. de laryngol., otol., et rhinologie de Paris*, July, 1890.

30. COLLES, C. J. The treatment of chronic purulent otitis media by excision of the carious ossicles and the removal of obstructions in the tympanic attic. *Amer. Jour. of Med. Sciences*, May, 1891.

31. Prof. BIRMINGHAM. Anatomy of the mastoid region.

Proceedings of the Royal Academy of Medicine in Ireland, January 9, 1891.

32. SHIELD, M. On otorrhœa. *Lancet*, July 25, 1891.

33. ZAUFAL, E., Prague. Contribution to the history of operative treatment of sinus thrombosis following otitis media. *Prager med. Wochenschr.*, 1891, No. 3.

34. SHIELD, MARMADUKE. Aural polypus with mastoiditis and threatened thrombosis. Perforation. Removal of polypus. Cure. *Lancet*, February 7, 1891.

35. MAKINS, G. H. Two cases of middle-ear disease complicated by thrombosis and suppuration of the lateral sinus successfully treated. *Lancet*, June 6, 1891.

36. LANE, W. A. Inflammation of the middle-ear and complications. *Lancet*, September 26, 1891.

37. PAGE, HERBERT. Two cases of middle-ear disease; cerebral symptoms; operation. *Lancet*, August 1, 1891.

38. Contributions to the study of cerebral abscess. *Publications of histories of cases and autopsies from the military hospitals*, xii., Berlin, 1891.

39. From the official reports of the clinics, policlinics, and the pathologico-anatomical institute of the Prussian universities upon the value of Koch's remedy against tuberculosis. Supplementary volume 1891, pp. 223-237.

40. SCHWARACH. The course of purulent inflammations of the middle ear in tuberculous patients under treatment with tuberculine. *Deutsche med. Wochenschr.*, 1891, No. 20.

41. Prof. BEZOLD. The course of the suppuration in the middle ear occurring in the course of phthisis pulmonum under the influence of Koch's treatment. *Deutsche Arch. f. klin. Med.*, vol. xlvii., p. 622.

42. USPENSKY, MOSCOW. Lupus of the middle ear. *Medicineskoje obosrenije*, 1891, No. 8.

43. HASBROUCK, SAYER. Primary acute inflammation of the external region of the mastoid process. *Journ. of Ophthalm., Otol., and Laryng.*, 1891, April.

44. DABNEY, S. G. Fracture of the tympanic portion of the temporal bone. *Med. News*, February 28, 1891.

45. DENCH, E. B. Chronic purulent otitis media as a cause of persistent facial neuralgia. *Amer. Journ. Med. Sciences*, April, 1891.

20. We point out from the interesting paper that Moos has mentioned four paths of invasion through which the micro-organisms, found by him and others, especially the streptococcus, the various forms of staphylococcus, and the pneumonia-diplococcus (*Frænkel-Weichselbaum*) enter the middle ear. 1. Since the occurrence of congenital otitis media purulenta cannot be doubted, it must develop through the circulation. 2. The Eustachian tube permits the invasion of microbes either directly or indirectly through the nutritive canals of the connective tissue with circumvention of the ostium pharyng. tubæ. 3. The third channel is the membrana tympani, either imperforate or perforated. 4. The microbes pass through the fissura petro-squamosa, along the process of the dura mater, from the cavity of the skull into the middle ear. The microbes, after invasion into the tympanum, produce either the well-known secretory form of the middle-ear catarrh, without suppuration, or an infiltration of the mucous membrane with numerous polymorphic migratory cells, or the suppurative catarrh. The most frequent complication of otitis media acuta is the purulent inflammation of the mastoid process. The appearance of erysipelas is of interest, "whether there existed previous pharyngeal erysipelas, and the secondary middle-ear affection became the connecting link for the subsequent extension to the face and head," or the suppuration of the middle ear became the starting-point. The following are the complications in chronic suppuration of the middle ear: cholesteatoma, the ordinary and tubercular caries with or without necrosis, sinus thrombosis, meningitis, and cerebral abscess. It is impossible to reproduce in a review the interesting details of this paper, and we therefore refer the reader to the original. NOLTENIUS.

21. Second case: otitis media acuta in patient, aged five; in the stage of desquamation with extensive suppuration over the mastoid process. Bone denuded of periosteum and superficially carious. In the mastoid process yellowish granulations. Third case: girl, aged four; otalgia during the stage of desquamation, increasing until the membrana tympani was perforated; intense suppuration, swelling behind the ear. A subperiosteal abscess was found, the corticalis was softened to a great extent, the mastoid process filled with soft granulations, the sinus laid bare. All three cases made good recovery, in spite of rapid destruction.

RUMLER.

22. BARCLAY says that in abscess of the tympanum, if the

nidus of the abscess is in the malleo-incudal niche of the attic of the tympanum, a free cut is to be made through the membrana flaccida; if in the atrium also or solely, operate as well or only upon the membrana vibrans at the most bulging point; or if the bulging is uniform, operate at the postero-inferior quadrant.

SWAN M. BURNETT.

23. In the treatment of ordinary catarrhal Eustachian salpingitis, SEISS insists on a careful medication of the nose and nasopharynx. There must be free breathing through both nostrils, and this should be secured by operative treatment if necessary, and of course perfect cleansing maintained. He has found benefit in the cirrhotic conditions of the drum cavity, from mobilization of the stapes, which he effects by making a free incision in the posterior segment of the drum-head and introducing a hoe-like instrument, and making gentle traction on the handle of the malleus or the incudo-stapedial joint. He does not favor excision of the drum-head and ossicles in the cirrhotic form, thinking it dangerous and of no utility. For necrosis of the ossicles he recommends it. He relieves annoying tinnitus by freezing the skin of the mastoid with ether or rhigoline spray at intervals of from one to six weeks.

SWAN M. BURNETT.

24. DELSTANCHE applies fluid vaseline in middle-ear catarrh through the catheter. This remedy had proved itself efficacious. He uses it also in cases of adhesion of the membrana tympani, or of the stapes, to the labyrinthine wall. The contents of the syringe are energetically driven through the catheter, and the fluid in the tympanum is then scattered by a few air-douches. The patient bears the procedure very well, and experiences an improvement of hearing. The less advanced the case, the surer is the success. In exudative processes and serous gatherings in the tympanum, fluid vaseline is also quite useful. It dislodges the exudation, mixes with it, and by liquefying it more or less, and by covering the surface of the organs, prevents the formation of adhesions. This remedy may in certain cases replace paracentesis with subsequent air-douches. The injection may be frequently repeated without harm. In order to prevent exudation after paracentesis, the author prefers fluid vaseline to injection of salt solutions, which is frequently accompanied by local reaction.

SCHIEFFERS (Liège).

25. The modification of the treatment with boric acid, as it is proposed by SCHEINE, is restricted to those suppurations which

are associated with the formation of masses of epidermis (cholesteatoma), and are characterized in most cases by the location of the perforation in Shrapnell's membrane, or in the postero-superior quadrant, and consists of direct insufflations of powdered boric acid through the opening of the cavity by means of Hartmann's small antrum tube modified by Bezold. This should be preceded by radical cleansing, with injections through the antrum tube and by careful drying. Granulations, of course, are to be removed before. The procedure requires assistance, besides practice in the use of the antrum tube. The results are in some cases excellent, as is illustrated by histories of cases. The author's description in the introductory remarks of a very rare form of suppurative otitis media is of great interest. It is located principally in the region of the tympanic end of the Eustachian tube, and is characterized by slight redness and swelling and by the formation from the viscid secretions of casts of the entire osseous tube and of the niches of the tympanic floor. It is obstinate to treatment.

26. In cases of otitis med. suppur., LINNELL has found a 50-per-cent. solution of boroglyceride in alcohol very efficient in destroying odor and for disinfecting purposes generally. He also thinks that its hygroscopic power has a beneficial effect on the inflammation in relieving congestion. SWAN M. BURNETT.

27. JAENICKE is not content with the results of boric acid treatment, as it is practised heretofore, since marked recoveries are rarely noticeable. Boric acid, he argues, dissolves in too small proportion in water in order to act well upon the mucous membrane of the tympanic cavity, and the powder does not penetrate into all nooks and corners. Jaenicke has found a composition which has the same antiseptic effect as boric acid solution of equal strength, but is superior to it in being more readily dissolved. It is neutral natrium boricum, which is formed by heating equal parts of boric acid, borax, and water, and dissolves at the temperature of the room to ca. 16 per cent. The author has good results in the treatment of chronic and subacute suppurations of the middle ear and in otitis externa purulenta. RUMLER.

28. After careful disinfection of the ear, and clearing the upper tympanic cavity of retention masses and granulations by means of the sharp spoon, GRUBER plugs the entire upper tympanic space with iodoform and sublimate gauze, and leaves the plug untouched. The plug is changed only on account of pain or fever, or when saturated with discharge, or offensive. With moderate secretions it remains from five to eight days. POLLAK.

29. LUC, after a review of the publications of Kessel, Schwartze, Lucae, Baracz, Ludewig, and Stacke, states that the use of the curette in suppuration of the osseous parts of the tympanum gives the same results as in other parts of the body. By this method, when carefully applied, suppuration of many years' duration can be brought to a standstill almost immediately. This procedure, however, is in some cases not sufficient; it should then be preceded by the removal of the first, or of the first two ossicles, since they may be the cause of suppuration, and since by their removal sufficient room is given to facilitate complete curetting of the tympanic cavity without danger. G. GELLÉ.

30. COLLES relates the histories of three cases of purul. otit. med. chron., in which he removed the malleus, which was found in all cases in a condition of necrosis. The result in all was that the discharge ceased and the drum cicatrized, and the hearing was much improved. In none was the incus present.

SWAN M. BURNETT.

31. BIRMINGHAM shows that the location of the sinus may vary as much as an inch; the greatest care, therefore, is to be taken in operations in this region. In trephining the middle cerebral fossa the point of the trephine of $\frac{3}{4}$ inch should be placed $\frac{1}{4}$ inch posteriorly, and from $1\frac{3}{4}$ to 2 inches above the centre of the external auditory meatus. The antrum can be reached with a trephine, which is placed upon it in such manner that the anterior margin of the opening is as near as possible behind the ear, and the upper margin not more than $\frac{1}{2}$ inch behind the upper margin of the external meatus; the trephine ought never to penetrate more than $\frac{3}{4}$ inch. He recommends as a general rule making all perforations in front of a vertical line, which runs $\frac{1}{4}$ inch behind the posterior margin of the external meatus; the latter ought to be laid bare in every case.

32. SHIELD delivered a clinical lecture on otorrhœa, in which he discusses our present knowledge, the prophylaxis, and the treatment of the affection.

33. ZAUFAL demonstrates that, as far back as in the year 1880, he has expressed his conviction that a cure of sinus thrombosis could be expected only by operation. He had then considered as necessary operative procedures, the ligation of the internal jugular vein and the opening of the thrombosed sinus. After having in 1889 reported a case in which, after trephining of the mastoid process, he had irrigated with a disinfected solution the sigmoid sinus opened by putrefaction, and had introduced a

drainage tube into the sinus, he lays down the following plan for operation of the thrombosed sigmoid sinus in otitis : The mastoid process must first be trephined, and the sinus exposed. If the sinus is obstructed in the foramen jugulare by a firm thrombus, ligation of the jugular vein is not necessary. If it is not, the vein must be ligated, even when it is also thrombosed, below the diseased portion. The thrombosed jugularis is to be opened below the ligature and the infecting masses removed by disinfecting injections. Zaufal quotes operated cases of sinus thrombosis, two of which were operated by Lane, four by Ballance, and two by Salzer ; five of these cases recovered completely. POLLAK.

34. This is an interesting report of a case which has been treated by SHIELD in the Charing Cross Hospital, which is a marked illustration of the advantage of timely operation. In the patient, a young man, fetid otorrhœa with marked cerebral symptoms were found December 3d. On the same day an incision was made over the mastoid process, the bone was carefully entered with the chisel immediately behind the external meatus, until the antrum was reached. The drainage tube was removed on the fifth day ; the cerebral symptoms had disappeared, and, after removal of the polypus, complete recovery took place.

35. The first of the two cases reported by MAKINS occurred in a patient aged eleven, who had had measles six years before, otit. media dextra for at least one year. Three weeks before the operation there existed swellings over both mastoid processes. The right process was opened with the chisel and an attempt was made to ligate the internal jugular vein, which, on account of previous destruction, was not found. The patient was considered cured when discharged from the hospital (St. Thomas). Makins thinks that the swelling over the left mastoid, due to subcutaneous bleeding, was caused by septic absorption from the ear. The second case was that of a patient, aged twenty-seven, with scarlatina twenty-five years ago. Continuous affection of the left middle ear. On March 20th chiselling of the left mastoid process. Very firm bone without cavity. Second operation was necessary on the 26th, when the opening was enlarged into the tympanic cavity. The wound was reopened on the 28th and the internal jugular vein ligated, whereupon the patient recovered.

36. LANE considers the mastoid antrum as a secretory reservoir for providing the middle ear with the necessary secretion. Neuritis optica in affections of the middle ear require *per se* an

operation. He recommends in all doubtful cases the opening, as well as the obliteration, of the tympanic cavity by means of hammer and chisel. The best remedy for sinus thrombosis is the immediate ligation of the internal jugular vein.

37. The first of the two cases reported by PAGE concerns a patient, aged sixteen, with otorrhœa of four years' duration, which ceased, whereupon cerebral symptoms set in. The skull was open $1\frac{1}{2}$ inches behind and below the osseous external meatus. A second opening was made with the trephine $1\frac{3}{4}$ inches above and behind the external meatus, from which offensive pus discharged. Healing without disturbances. In the second patient, with otorrhœa of four years' standing, the antrum was opened with the chisel behind the external meatus and pus was immediately found. The two cases illustrate that, even where marked cerebral symptoms are present, the antrum should first be opened.

38. Among seventeen cases of cerebral abscess four were due to purulent affections of the ear (cases 14-17). The last case (17) is of interest because, notwithstanding the existence of a cerebral abscess for a long period (in consequence of a preceding otitis?), the phenomena of the affection (acute otitis and cerebral symptoms) were not noticed until the last two weeks. "The diagnostic rule of excluding the possibility of a deep-seated cerebral abscess, when cachexia and fever are wanting or have been absent for a long period, is therefore unwarranted." ZARNIKO (Berlin).

39. Among sixteen aural patients, treated in the aural clinic of Berlin (LUCÆ) with injections of tuberculin, six suffered simultaneously from phthisis pulmonum, four from swelling of the lymphatic glands, one from lupus of the face; among five no tuberculosis was present. Tubercle bacilli could not be found in the aural secretions of these individuals. The general reaction was not of especial interest. Local reaction took place in about one half of the cases, and consisted mostly of sensation of heat, redness, and sensitiveness to pressure upon the mastoid process, slight spontaneous pain and ear noises; in one case swelling of the mucous membrane with secretion of pus, in another case occurrence of acute otitis of the heretofore normal ear, in a third case migrating painful swelling of the face took place. Therapeutic results: mostly negative, in one case marked improvement; in no case impairment. (Reviewer cannot convince himself from the histories of cases, that all these otitides were really tuberculous;

in the cases 6, 13, and 4, this supposition appears quite improbable, in several others at least doubtful.) It is worthy of consideration that, in some of these cases, after the injections, slight symptoms, especially ear noises, appeared, which we supposed to form a "local reaction." From the aural polyclinic of the university of Bonn (WALB), in a patient with chronic otorrhœa and tuberculous rhinitis, an extremely violent general (high fever, delirium, vomiting) and local reaction (immense swelling and redness of the entire nose and its adjoining parts, formation of crusts in the vestibula narium) were observed after the injection of 0.0005 tuberculine. Similar symptoms followed further smaller (0.0002) doses. A case of periostitis tuberculosa of the mastoid process in a boy aged fifteen, healed without trouble after the third injection, after having for weeks remained unaltered. In a patient, whose tubercular otitis was cured, otorrhœa appeared after the first injection (0.0005). Walb advises beginning with very small doses, which cause a purely local reaction; when fever is produced, the dose has been too large. From the aural clinic at Halle SCHWARTZE reports that the experiments with Koch's remedy against tuberculosis did not begin at his clinic until the end of November, 1890. The general reaction described by Koch was observed in all cases; the local reaction was in some cases extremely marked, in others not noticeable. A curative effect upon the local tubercular affection in the temporal bone, and also in the ethmoidal bone and the frontal sinuses could, of course, not be expected, considering the brief duration of observation.

ZARNIKO.

40. SCHWABACH reports sixteen aural patients injected with tuberculin, viz.—eleven for pulmonary phthisis, one for multiple tuberculosis of the bones, and four without signs of tuberculosis. These last cases never exhibited local reaction, but two showed general reaction. With reference to the other twelve cases the following points are worthy of notice: The tuberculous character of the aural affection was established in three cases by the demonstration of bacilli. (Whether the remaining otitides were tuberculous or not, does not clearly follow from the author's statements; it is doubtful in two cases, in which purely dry perforations were present.—Reviewer.) General reaction was always present, except in one patient. Local reaction was in one case (tuberculosis of bones) violent (intense swelling, sensitiveness to pressure) and redness of the mastoid region, considerably increased discharge, at times sanguinolent, at others moderate

(slight pain and ear noises). In two cases increase of bacilli. Therapeutic result : In six cases negative, in three impairment (rapid consumption, facial paralysis, meningitis, exitus), one case (tubercle bacilli in discharge) was cured. The author leaves it undecided, to what extent the course of the observed affection had been influenced by the remedy. ZARNIKO.

41. In a young man affected with severe phthisis pulmonum, unilateral suppuration of the middle ear appeared after the beginning of the injections. The course and autopsy demonstrated some appearances not observed at other places (formation of swelling extending from margin of perforation over the membrana tympani ; formation of fibrinous masses of exudation ; permanent presence of tubercle bacilli in the aural secretions), which the author refers to the action of the remedy. He arrives at the conclusion that reaction has taken place in this case, but it was not sufficient to allow us to expect complete recovery if it had occurred in a similar case in an earlier stage of the general affection. ZARNIKO.

42. Peasant, aged eighteen, nasal lupus. Two months ago otorrhœa dextra without pain, which had almost disappeared at the time of admission to the clinic. January 20, 1891, injections of tuberculin (how much ?). No reaction in the ear. January 22d, after second injection (how much ?) most intense aural pain during an entire night, then intense otorrhœa muco-purulenta. Examination by ear specialist after five days. Perforation antero-inferiorly ; swelling of membrana tympani, so as to make it impossible to distinguish the handle of the malleus. Reaction in the ear did not occur until after the eleventh injection, February 15, 1891. USPENSKY found after this : "The upper third of the membrana tympani covered with nodular (tubercular), fine, miliary eruption and intensely hyperæmic." Behind the malleus two dot-shaped superficial ulcerations developed, while the hyperæmia decreased. February 20th, the membrana tympani no longer reddened, denuded of epidermis and covered at places with epidermis scales ; in place of the ulcerations dot-shaped spots, reflecting the light ; discharge considerable, hearing power impaired. Microscopically numerous micro-organisms (bacilli and cocci), in one case a few Koch's bacilli were found, a few leucocytes, many epithelial cells. Exitus of the case unknown. Uspensky arrives at the conclusion that in this case the tuberculin was of diagnostic value. SCHMIDT.

43. HASBROUCK describes a case in which, during a few

weeks after previous pain in and around the ear, the external region of the mastoid process became inflamed without any sign of inflammation of the middle ear. Hot applications gave temporary relief, but Wilde's incision was made, which led to complete recovery.

SWAN M. BURNETT.

44. In DABNEY's case a boy of twelve years fell and struck the left side of his head on the floor, and was unconscious for two hours. Some discharge of blood, but not of water. Some dizziness and unsteadiness of gait, and hearing impaired. Watch only on pressure. Tuning-fork (C³) louder on mastoid than by air. Membrana tympani red. Vision in left eye impaired and optic disk on that side congested. All the symptoms disappeared and hearing improved to $\frac{2}{4}$.

SWAN M. BURNETT.

45. DENCH relates the clinical history of a woman who had a persistent facial neuralgia on the left side, which, on inquiry, was found to date from the time, six years back, of an inflammation on the left ear. Examination showed a perforated drum-head and evidences of a chronic purulent otitis. This was treated and cured, and the neuralgia ceased.

SWAN M. BURNETT.

c.—NERVOUS APPARATUS.

46. LARSEN, P. C., Copenhagen. Case of cerebro-spinal meningitis complicated with aural affection; death; autopsy. *Nord. medicinske Arkiv*, vol. xxii.

47. POMEROY, O. D. On some points in the pathogenesis of aural vertigo. *N. Y. Med. Journ.*, June 20, 1891.

48. WÜRDEMAN, H. V. A case of hysterical deafness. *Medical News*, February 14, 1891.

49. DABNEY, S. G. A case of Ménière's disease. *Medical News*, February 28, 1891.

50. GELLÉ. A case of deafness following mumps. *Soc. laryng., otol., et rhinol. de Paris*, June, 1891.

51. Prof. HABERMANN, Graz. Atrophy of the nerve in the inner ear. *Zeitschr. f. Heilk.*, vol. xii.

52. FERGUSON, Toronto. The auditory centre. Valuable clinical evidence as to the exact position of this centre. *Journ. of Anat. and Physiol.*, January, 1890.

46. A. R., aged 7 years and three quarters, became ill on January 25, 1890, deaf on February 2d in both ears during the

night ; on February 3d, pain in the right ear ; February 5th, deafness increased ; February 8th, membrana tympani, on examination, lustreless. No swelling or sensitiveness around the ear. Osseous perception for the tuning-fork destroyed. February 9th, complete deafness. Afterward paralysis of the right extremities set in, with clonic convulsions and loss of consciousness. Death on March 9th. Autopsy on March 11th. Examination of the temporal bones on March 12th and 13th. Meningitis purulenta cerebro-spinalis. Os temporis dextrum : membrana tympani imperforate. In tympanic cavity and mastoid antrum muco-pus. In porus acoustic. intern. pus was also found. Canales semicirculares, vestibulum, and cochlea are filled with reddish, soft connective tissue, which consists microscopically of bundles partly infiltrated with round cells in fatty degeneration, and blood corpuscles. Os temporis sinister like the right one, but the vestibule contains some pus. The nerves do not show particular alterations. The author believes that the labyrinthine affection is dependent upon the transmission of the meningitis along the aqueducts and the nerve sheaths to the soft parts of the labyrinth. With reference to the treatment of cerebro-spinal meningitis associated with aural disease, he advocates rapid and energetic antiphlogosis, calomel, etc.

V. UCHERMANN.

47. POMEROY gives the histories of twenty-five cases of aural disease, in which vertigo was a prominent symptom. Among these he found chronic dry catarrh but once. He finds it frequently in aural polypi and, of course, in labyrinthine disease, and in middle-ear disease where there is pressure on the labyrinthine fluids. It was also present in cases where the drum-head was sunken.

SWAN M. BURNETT.

48. In WÜRDEMANN's case a girl had otitis med. catarrh., for which she was treated by paracentesis, catheterization, etc., and the symptoms were markedly improved. Suddenly she became totally deaf for spoken words, though she heard noises. There were areas of insensibility embracing parts of the pinna, auditory canals ; and drum-heads on both sides. A strong current of electricity was applied to the ear and the neck, and a blister to the nape of the neck. In three days she began to hear. In two weeks hearing almost entirely restored, though there were still areas of diminished sensibility.

SWAN M. BURNETT.

49. In the case of DABNEY a man of fifty was suddenly seized with vertigo, tinnitus, and total deafness in right ear. Later there

was nausea and vomiting. No history of syphilis, but patient was addicted to the use of alcohol. The deafness was permanent.

SWAN M. BURNETT.

50. GELLÉ reports a case under his observation of complete deafness in the left ear after mumps. No noteworthy alterations in the conducting apparatus. GELLÉ, therefore, diagnosed nervous deafness.

51. In eleven cochleæ atrophy of the nerves was found in the base, either locally in the terminal portion or in isolated cases reaching higher into the middle turn. These cochleæ, with the exception of two, were taken from persons who were over sixty years of age; HABERMANN, however, does not believe, that senile marasmus alone had caused the atrophy in all these cases, although he admits the possibility for some cases. Twelve cochleæ presented general nervous atrophy of different degree up to complete destruction. They were taken from individuals of different ages, who had suffered partly from different middle-ear processes, partly from labyrinthine affections, tumors in the cerebral cavity, etc.; in one cochlea absence of the nerve in the upper turn, associated with general atrophy increasing toward the base, was found.

POLLAK.

52. A young man with struma had suffered for eight years from suppuration of the right ear. Two years previous to his death, symptoms of cerebral tumor of the right temporal region appeared, and during the last six months of his life deafness in the left (?) ear became complete. At the autopsy a large tumor was found, which had destroyed the first temporal convolution of the right side; the second temporal convolution was but partially affected.

f.—NOSE AND NASO-PHARYNX.

53. CARTAZ. Eczematous erythema in consequence of salol insufflations. *Bull. soc. laryng., otol. de Paris.*, June, 1891.

54. GOTTSCHALK, S. Case of anosmia after removal of both ovaries. *Deutsche med. Wochenschr.*, No. 26, 1891.

55. ROLAND. Rhinitis fibrinosa. *Réunion des otol. et laryng. belges*, May 7, 1891.

56. OLYMPITIS, M. Tuberculosis of the nasal mucous membrane (primary and secondary form). *Thèse de Paris*, 1890.

57. RAULIN. Contribution to the study of primary lupus of the nasal mucous membrane. *Thèse de Bordeaux*, 1889.

58. WAGNIER. Relations between ocular and nasal affections. *Ibidem*.

59. LERMOYEZ, M. Accidents in consequence of intranasal operations. *Annales des malad. de l'oreille*, etc., February, 1891.

60. THILLY, S. Deviations and ecchondroses of the nasal septum and their treatment with electrolysis. *Thèse de Lyon*, November, 1890.

61. SANDMANN, G., Berlin. A new method for the correction of the nasal partition wall. *Deutsche med. Wochenschr.*, 1891, No. 9.

62. GELLÉ. Extensive perforation of the cartilage of the nasal septum in typhoid fever.

63. GUYE, Prof. Contribution to the etiology of inflammation of the tympanic cavity, produced by injections of fluids into the nose. *Berliner klin. Wochenschr.*, 1891, No. 11.

64. LOEWENBERG. Otitis media following the use of the naso-pharyngeal douche. *Berliner klin. Wochenschr.*, 1891, No. 18.

65. EITELBERG, Vienna. Affections of the hearing organ following nasal irrigations and operations. *Wiener med. Presse*, 1891, No. 23.

66. USPENSKY. Two cases of hypertrophic rhinitis with disturbances of the voice, cured with the galvano-cautery. *Medicinskoje obosrenije*, vol. xxxv., No. 1.

67. MICHELSON, Koenigsberg. Naso-pharyngeal polypi. *Berl. klin. Wochenschr.*, 1891, No. 5.

68. SCHECH, Prof., Munich. Diagnosis and treatment of the diseases of the nasal accessory cavities. *Deutsche med. Wochenschr.*, 1891, No. 6.

69. ZIEM. Extraction of a broken-off irrigating canula from the antrum of Highmore. *Berliner klin. Wochenschr.*, 1891, No. 17.

70. SUAMENSKY. Contribution to the treatment of empyema of Highmore's antrum. *Medicinskoje obosrenije*, vol. xxxv., No. 7.

71. WINDLER, E., Bremen. Contribution to the diagnosis of adenoid vegetations. *Wiener med. Wochenschr.*, 1891, No. 21.

53. CARTAZ reports three cases from his private practice in which nasal eczema developed in consequence of insufflations of salol; it disappeared immediately after the detection and removal of the cause.

GELLÉ.

54. GOTTSCHALK observed the entire absence of the hereto-

fore well-developed sense of smell in a virgin castrated on account of myoma. Since neither anomalies of the nasal mucous membrane nor indications of cerebral affection were present, the author believes to be justified in considering the anosmia as a reflex neurosis, pointing to the fact that the olfactory sense is readily influenced by changes in the female generative organs. The treatment with the constant current seems to confirm his view.

NOLTENIUS.

55. ROLAND observed in brief intervals, in the same family, fibrous rhinitis in a boy and a girl. The affection was cured in from two to three weeks, the membranes discharged on the eighth day, and profuse suppuration came on.

SCHIFFERS (Liège).

56. OLYMPITIS does not mention the acute form of nasal tuberculosis, of which but one case is published. The chronic form presents itself in two ways, which greatly differ clinically from each other. The first appearance of tuberculosis (primary form) develops, or it is but a concomitant sign of a more or less advanced pulmonary tuberculosis (secondary form). The primary form is more interesting, it offers more difficulty to treatment, and it presents itself most frequently in the form of polypoid tumors, which are more or less pedunculated; it appears especially in children, under the mask of ozæna; it may be associated with complications in the lungs or the meninges. He recommends for treatment curetting and lactic acid.

GELLÉ.

57. RAULIN considers the lupus of the nasal mucous membrane a tubercular affection; it occurs most frequently upon the cartilaginous septum, whereby diagnostic difficulties arise with reference to syphilis. The course is slow; the upper respiratory tracts are gradually implicated; symptoms of ozæna do not appear.

G. GELLÉ.

58. WAGNIER reports some observations of cures of dacryocystitis, conjunctivitis, and chronic keratitis by the removal of papilloma of the lower turbinated body, and by the treatment of chronic rhinitis and ozæna.

SCHIFFERS (Liège).

59. These accidents are of much rarer occurrence than would be *a priori* supposed, if we take into consideration the abundant vascularization of the nose and also the quantity of microbes found there; on account of the great variety of symptoms an

attempt at classifying these accidents seems useless. We may, nevertheless, arrange them into three main groups: A. Infectious. B. Nervous. C. Mechanical.

A. Infectious accidents. The infection may have a local cause or it is transferred. As to the first cause, the habitual microbes of the nasal cavities (*pneumococcus diplococcus* (Friedlaender), *streptococcus pyogenes*, *staphylococcus albus* and *aureus*, etc.) enter the body through the entrance produced by the operation or through the intact mucous membrane, in which the trauma has retarded the normal exit of phagocytes. With reference to the second cause—viz., introduction of germs from the outside,—poorly disinfected instruments, and especially the patient's finger, are the usual agents; furthermore, the stagnant nasal secretions form a culture medium, upon which the most exhausted microbes, which always lie dormant there, may be aroused to full activity. We may then observe: Diffuse rhinitis, submucous abscesses, diphtheria of the wound, conjunctivitis, otitis media, meningitis, arthritis, pyæmia, scarlatina, relapses of diatheses, syphilis, rheumatism, and gonorrhœa.

B. Nervous accidents. They are much more frequent than the infectious ones, especially neuralgia, megrim, vertigo, swooning, disturbances of sight, asthma, spasm of the glottis, Graves' disease, general depression.

C. Mechanical accidents. Epistaxis and permanent nasal redness.

G. GELLÉ.

61. After a brief synopsis of the usual methods of operation and instruments SANDMANN recommends for "the vertical protuberances, and those prominences which offer no edge for the working of the nasal saw" a file with rough and fine teeth, which is inserted into a handle bent at an obtuse angle.

NOLTENIUS.

62. GELLÉ reports a case of perforation of the nasal septum in a waiter, aged sixteen, after typhoid fever of three weeks' duration. Before and after the fever intense epistaxis had repeatedly taken place; the ulceration advanced slowly. There seemed to exist considerable local irritation, since the patient continually scratched the nostrils with the finger-nails and soiled his handkerchiefs with blood. These cases, although of rare occurrence, have been observed and published before.

G. GELLÉ.

63. GUYE mentions two cases in order to demonstrate that complete occlusion of one nostril with the nozzle during syringing

is dangerous, and he lays down the following rules for the treatment: 1. The nose ought not to be forcibly syringed, especially in the early years of life, until the physician has examined the nose as to its patency. 2. The nose ought never to be injected with a syringe occluding the nostril.

RUMLER.

64. In addition to Guye's paper LOEWENBERG holds that the naso-pharyngeal douche is generally not dangerous, and that for the occurrence of middle otitis blowing of the nose after the douche is responsible. The blowing, therefore, ought not to be permitted until after ten minutes.

RUMLER.

65. EITELBERG warns against nasal irrigations and the snuffing up of medicated solutions into the nose, since they are frequently followed by suppurative otitis. This is also observed after removal of swellings of the nasal mucous membrane with the snare, even after simple cauterization with chromic acid of the hypertrophic lower turbinated bodies.

POLLAK.

66. Two ordinary cases. The patients were singers of twenty-six and twenty years of age respectively. The voice lost its nasal timbre and its sonorousness, and clearness increased.

SCHMIDT.

67. MICHELSON will reserve the designation of naso-pharyngeal polypus exclusively for the "typical cases of hard fibromata inserted broadly at the base of the skull." Among the three cases reported Michelson operated two with the galvano-caustic snare, the third one with the choana-forceps and subsequently with the cold snare. Michelson, for the removal of nasal mucous polypi growing into the naso-pharynx, recommends the snare. He has never felt the necessity of a preliminary operation as it is practised up to date by prominent surgeons, even in multiple nasal mucous polypi.

JENS (Hanover).

68. The author reproduces a lecture delivered before the laryngological section of the Tenth International Medical Congress, in which he gave a brief and clear review of the etiology, diagnosis, and treatment of this affection. He is not quite justified in believing that Hartmann's method is of the same value as the irrigation through a natural opening. In most cases the artificial opening is situated farther backward, where in some cases a foramen accessorium is found. It is interesting that the author has succeeded in curing persistent cases by establishing an acute inflammation, especially by injections of a twenty-per-cent. solution of aluminium acetico-tartaricum.

NOLTENIUS.

69. ZIEM was so unfortunate as to break off in two successive cases the canula close to the maxillary margin so as to be unable to grasp it with the forceps. He succeeded in both cases in pulling it out by means of a wire-snare, which was introduced upward along the piece of the canula.

70. SUAMENSKY discusses only cases of dental origin. The regular treatment consists in the extraction of the decayed teeth and the insertion of a metal or rubber canula, which is to be occluded during the meals. Daily irrigations through the cavity with astringents and disinfectants. If no sequestra are present in the cavity the suppuration ceases after five to six weeks. Removal of the canula ; healing of the operative canal. This healing, if left to itself, is the frequent cause of relapses of the affection of Highmore's antrum. When the alveolar end of the canal closes before the end near the antrum the remaining pus infects the cavity anew. In order to avoid this procedure Suamensky recommends the introduction of conical stiff rods, which are shortened 2 *mm* every four days and are entirely removed when the canal at the end near the antrum is entirely closed.

SCHMIDT.

71. WINDLER, on account of these statistics, recommends Schaeffer's criteria as extremely useful.

POLLAK.

REPORT OF THE PROCEEDINGS OF THE OTOL-
 OLOGICAL SECTION OF THE SIXTY-FOURTH
 MEETING OF GERMAN NATURALISTS AT
 HALLE, SEPTEMBER 21st to 25th, 1891.

By A. TRUCKENBROD, HAMBURG.

Translated by Dr. MAX TOPPLITZ, New York.

The section was opened on Monday, September 21st at 4 P.M., in the lecture room of the ophthalmic and aural clinic of the royal university, by the president, Professor SCHWARTZE, who heartily welcomed the gentlemen present, and called attention to the number of papers to be read. SCHWARTZE was then elected by acclamation as honorary president of the section.

The following forty-five gentlemen had registered their names :

<i>Ulrichs</i> , Halle.	<i>Habermann</i> , Graz.
<i>Kiesselbach</i> , Erlangen.	<i>Wagenhaeuser</i> , Tübingen.
<i>Ludewig</i> , Hamburg.	<i>Koch</i> , Braunschweig.
<i>Szenes</i> , Budapest.	<i>Truckenbrod</i> , Hamburg.
<i>Kaufmann</i> , Hamburg.	<i>Bock</i> , Magdeburg.
<i>Christenack</i> , Brandenburg.	<i>Pagenstecher</i> , Wiesbaden.
<i>Reinhard</i> , Duisburg.	<i>Lemcke</i> , Rostock.
<i>Spahn</i> , Crefeld.	<i>Kretschmann</i> , Magdeburg.
<i>Hauermann</i> , Bremen.	<i>Rohde</i> , Halberstadt.
<i>Kayser</i> , Breslau.	<i>Breul</i> , San Francisco.
<i>Walb</i> , Bonn.	<i>Stacke</i> , Erfurt.
<i>Joel</i> , Gotha.	<i>Möldenhauer</i> , Leipsic.
<i>Schubert</i> , Nuremberg.	<i>Hecke</i> , Breslau.
<i>Brügger</i> , Breslau.	<i>Siebenmann</i> , Bâle.
<i>Grunert</i> , Halle.	<i>Scheibe</i> , Munich.
<i>Robitzsch</i> , Leipzig.	<i>Loewe</i> , Berlin.

Schmiegelow, Copenhagen.

Krakauer, Berlin.

Schwartz, Halle.

Panse, Halle.

Davidsohn, Berlin.

Beckmann, Heidelberg.

Hessler, Halle.

Nager, Lucerne.

Jacoby, Magdeburg.

Barth, Marburg.

Stimmel, Leipsic.

Becker, Dresden.

Wehmer, Berlin.

KIESSELBACH then read a paper: "The Correspondence of Galvanic Reaction in the Eye and Ear." The author, from a series of examinations, arrived at the conclusion that the eye and ear react in exactly the same manner to the galvanic current.

The second paper on: "Affections of the Middle Ear in Nasal Lupus," was read by BRIEGER, who had found in several cases of lupus of the nose and pharynx an affection of the middle ear, which was to be considered lupus.

In the discussion SCHWARTZ reports a similar observation, in which an affection of the middle ear was associated with nasal lupus. The autopsy, however, did not reveal a direct connection between the two affections.

Third paper, TRUCKENBROD: "A Case of Cerebral Abscess Following Otitis Media Cured by Operation." The paper is published in full in this number of THE ARCHIVES. The discussion was delayed until Tuesday, on account of the advanced hour.

SECOND MEETING, TUESDAY, SEPTEMBER 22D, 11 A.M.

President: DR. PAGENSTECHER (*Wiesbaden*).

First paper, STACKE: "Further Communication on the Opening of the Cavities of the Middle Ear by Detaching the Auricle." The author opens and cleans out the attic after detaching the auricle by a long curved incision, then cutting the external meatus transversely near the beginning of the osseous portion and enlarging the field with chisel and hammer. Then follows the excision of the membrana tympani, and the extraction of the malleus and incus. The operation is without danger, except for the possibility of injury to the facial nerve, which cannot always be avoided. The operation also is valuable with regard to the diagnosis of suppuration of the mastoid antrum, since the entire field is exposed to view. In case of suppuration of the antrum the mastoid process also should be chiselled.

After the operation the auricle is reattached by sutures. Of thirty-three cases STACKE cured nineteen; nine are still under treatment. The treatment lasted from three to nine months. The lecture was illustrated with drawings, specimens, and the presentation of patients operated according to this method, and excited general interest.

LOEWE: "A Demonstration of Instruments for STACKE's Operation." He again recommends, as at the International Congress in Berlin, his drilling instruments for the opening of the attic and antrum, which are to be attached to a dental engine.

In the discussion SCHWARTZE emphasizes the great dangers from drilling instruments, *e. g.*, in case of the anterior location of the transverse sinus, and mentions how easily the facial may be injured. SCHWARTZE feels justified in rejecting this method completely.

LOEWE admits the danger of injury to the facial.

KRETSCHMANN thinks careful stoppage of bleeding and illumination of the field of operation very important, and therefore uses a small incandescent lamp on dull days. He makes the cutaneous incision like STACKE, but he opens first the mastoid antrum and then the attic, after chiselling off the posterior wall of the osseous meatus. The mastoid is kept open by sewing in the cutaneous flaps, and the entire defect is covered by a plastic operation.

SCHWARTZE has operated for the last ten months according to this method in chronic suppurations, which were confined to the antrum or attic, and in which chiselling of the mastoid process was not indicated. He has operated on twenty cases, four of which were cured; in one facial paralysis set in. Among the permanent cures is one case of apparently permanent cure of cholesteatoma. The after-treatment required less time than that with the lead nail—on the average, four months.

REINHARD (on malleo-incus extraction) confirms STACKE's indications. He has operated thirty cases, seven of which are to be excluded on account of complications from the mastoid process. Of twenty-three cases in which the mastoid process was not implicated, fourteen were cured. REINHARD is more in favor of SCHWARTZE's old method, and he does not deem it necessary to open the attic in every case.

In the discussion STACKE recommends his method (opening the attic with malleo-incus extraction) for severe cases; for

lighter cases, however, he tries first to get the desired effect by SCHWARTZE's method. SCHWARTZE shares this view; there is danger of facial paralysis, and of vertigo and vomiting after injury to the stapes in his method also.

In the discussion of TRUCKENBROD's paper, which had been laid over until to-day, SCHWARTZE pointed out the great difficulties in the diagnosis of cerebral abscess.

HABERMANN then read his paper on affections of the hearing organ in consequence of *tabes dorsalis*, with demonstration of specimens. He found atrophy of the acoustic nerve.

SCHEIBE then demonstrated various specimens and drawings of pathological conditions of the labyrinth.

THIRD MEETING—THURSDAY, SEPTEMBER 24TH, 11 A.M.

President: PROF. WALB (*Bonn*).

KRETSCHMANN presented a patient with an open mastoid cavity, who had been operated according to his method and had almost entirely recovered (still under treatment).

SCHWARTZE demonstrates a cured case of cholesteatoma with open mastoid cavity.

SCHWARTZE, in addition to STACKE's paper, mentioned that he had observed facial paralysis in one case, and that the Fallopian canal frequently takes an abnormal course. The prolongation of the cutaneous incision to such an extent as to lay bare the zygoma is dangerous, since he has seen necrosis at isolated points in the normal squamous portion after extensive removal of the periosteum. He recommends exposing the bone to the smallest possible extent.

SIEBENMANN then demonstrated beautiful dry specimens, *e. g.*, sections through the skull, the nose, and the naso-pharynx of the new-born. He places the fresh specimens first into diluted alcohol, gradually into more concentrated, and finally into absolute alcohol, hardens them in chromic acid, places them in turpentine, and finally, for the production of his masterful corrosion specimens, pours over the dried, leathery, but porous specimens, his metallic solution. SIEBENMANN exhibited a series of fine corrosion preparations, which were much praised.

KRAKAUER spoke on multiple exostosis of the skull, with a demonstration of the exostosis of the external auditory meatus in his case. KRAKAUER removed it with the chisel after detaching the auricle.

SZENES in his paper on "Therapeutic Effects of some New Otological Drugs," discusses a few drugs, and communicates his results from their use. Furthermore he reports in his "clinical contributions" three patients, in whom after an acute otitis media had run its course in one ear, the other ear was affected with the same disease. He would suggest for this transmigration of otitis media the name, *otitis media acuta migrans*.

BRIEGER, in the discussion of the first paper by SZENES, considers dermatol unsuitable for the treatment of aural affections, on account of its absolute insolubility.

With reference to the second paper, HABERMANN and BRIEGER supposed that a nasal or naso-pharyngeal affection had likewise caused the affection of the second ear, since the Eustachian tube must be considered as the point of entrance.

The next paper was read by WALB, on "The Use of LUCAE'S Pressure Probe in Diseases of the Middle Ear." WALB considers it very useful for mechanical treatment, and had good results when it was used for a long period, at least three months. He has also tried to glue the probe to the short process with syndeticon, in order to act by traction outward as well as by pressure. KRAKAUER combines massage and catheterization in such manner that the outward bulging of the membrana tympani, produced by inflation of air through the catheter, is intensified by aspiration from the external auditory meatus.

JOEL recommends for this purpose a rarefying apparatus, which should always be applied by the physician and never by the patient.

STIMMEL has also tried LUCAE'S probe in sclerosis, but without improvement of the hearing in any case. He has observed, however, diminution of the tinnitus. He began with three-pressure movements, which he gradually increased to twenty.

WALB makes one hundred pressure movements, beginning with twenty, later twice a day, and his results have lately been better, since he uses more energetic treatment.

WEHMER had in most cases no beneficial result, in isolated cases slight improvement. One case, which had been treated by another physician, improved in the beginning, but rapidly grew worse.

SCHWARTZE considers tragus-compression just as successful as the pressure probe.

STIMMEL frequently uses tragus-compression; he has observed, however, but two beneficial results.

JOEL asked the gentlemen present their results with ASCHENDORF's hearing tube.

WALB had not seen any good result from its use in nearly one hundred cases.

KRAKAUER also had not observed the slightest benefit in fifty cases.

SCHWARTZE considers the end-piece for insertion into the external meatus badly devised; he has had in a few cases good results, after the end-piece had been modelled after a plaster cast.

BRIEGER had good results with an apparatus made from a plaster cast.

LOEWE then read his paper on "Blennorrhœa of the Middle Ear." He recommends plugging the tympanic cavity, and if this is unsuccessful and pus is discharged from the antrum or attic, he makes a canal with his trephining machine and plugs this canal. (The reviewer hopes that his example will not be followed.) In small perforations of the membrana tympani he circumcises it and thus enlarges the perforation, since the movable membrana tympani is pulled inward by the malleus.

HECKE reports, in his "Contributions to the Cure of Metastatic Pyæmia in Diseases of the Middle Ear," two cases, which recovered in spite of the severity of the affection. In the first case the caries of the mastoid process was complicated with pleuritis, with suppuration in the sterno-clavicular and shoulder joints. In the second case the caries of the mastoid process was cured, leaving a permanent fistula. The other ear also became affected after a cold, and caries of the other mastoid, with an inflammation of the elbow-joint, set in. This case was also cured after operation.

In a fatal case the pyæmia and caries of the mastoid developed after extraction of a foreign body. An operation could not be performed on account of bilateral pneumonia.

HECKE read also a paper on "Extradural Suppuration in the Course of Middle-Ear Affections." In two cases the pus was removed by operation. The first case died from meningitis. The course of the second case was quite favorable, and the patient was about to be discharged from the hospital when he suddenly died from meningitis.

HESSLER, in one hundred cases of chiselling, found the dura mater exposed in seventeen cases, fourteen of which recovered, and in four, abscesses were discovered. He found in the

literature on the subject fifty cases of extradural abscesses, of which fourteen recovered. Death ensued in the remaining cases partly from sinus phlebitis, partly from meningitis and cerebral abscess. Hessler demonstrated a specimen.

BRIEGER demonstrated an apparatus for rapid sterilization of water during operations.

At the conclusion of the meeting WALB expressed the thanks of the section to Prof. SCHWARTZE, and also to the secretaries, Dr. SZENES, Dr. GRUNERT, and Dr. PANSE, for the management of the executive business.

SCHWARTZE expressed his thanks to all the gentlemen of the section for their zeal, and especially to those who had come from a distance. He hoped that everybody took something home with him for the benefit of the patients, and he wished that the next meeting at Nuremberg in 1892 might be as well attended.

Reviews.

The Anatomical and Histological Dissection of the Human Ear in the Normal and Diseased Condition.

By Dr. ADAM POLITZER. Translated from the German by GEORGE STONE. London, Ballière, Tindall, & Cox., 1892.

The specialty of otology is rapidly moving to the front. Among those, either in Europe or America, who have contributed to its advance, Politzer of Vienna undoubtedly stands foremost. Every department of otology has been illumined by his labors. As a teacher, as a scientific worker, as a therapist, as a pathologist, his services have been unrivalled.

Here we have his latest contribution, and it is a most valuable piece of work. Indeed, its appearance may be said to mark an era in scientific otology. Since Toynbee's time no work on the pathological anatomy of the ear of equal importance has appeared. It was much needed, for from ordinary treatises on pathology little help can be obtained in aural pathological anatomy, and the otologist, anxious to cultivate this field, must have felt very much the want of such a guide as the one before us.

Politzer first describes and figures the necessary instruments. The various methods of removing the organ of hearing are then described, as well as the examination of the cranial cavity and brain in connection with the cavities of the ear. The author then proceeds to demonstrate the macerated temporal bone first in the new-born infant and then in the adult ; the sections described give excellent views of the relations of the cavities and canals of the ear to one another, as well as to the cranial cavity and blood channels in the vicinity. In the infant the peculiarities of the antrum mastoideum and the osseous part of the external auditory canal are admirably demonstrated and illustrated with wood-cuts ; the gap in the tympanic plate, existing in the early years of life, is shown to be of considerable pathological importance.

A large part of the work is of course devoted to the various anatomical and pathologico-anatomical preparations of the organ. The modes of examining the middle ear are given in great detail. The relation of the upper tympanic cavity, or malleo-incudal niche, to the antrum in connection with those purulent diseases of the middle ear attended by perforation of the membrana flaccida, is pointed out. This dissection is of especial value in view of the recent methods of treating cases of suppuration in the upper tympanic cavity by surgical removal of the malleus or of both malleus and incus. The examination of the inner wall of the tympanum, especially of the fenestral regions, is of great importance. The capacities of these recesses, especially of the niche of the fenestra ovalis, present great differences in normal ears—in some, spacious, in others, strikingly narrowed, so that the crura of the stapes may be in immediate contact with the inferior or lateral walls of the niche. As Politzer remarks: "There is no doubt that such a congenital narrowness of the niche of the fenestra ovalis favors, in inflammatory processes of the lining membrane of the middle ear, adhesions of the crura of the stapes with the niche of the fenestra."

The sections of the mastoid process are very instructive, especially the horizontal ones. Politzer is of opinion that only in 36.8 per cent. are the mastoid cells throughout pneumatic. In the majority they are either partly pneumatic and partly diploëtic or diploëtic altogether. On these horizontal sections the relations of the lateral sinus to the antrum, to the external surface of the mastoid process, and to the external auditory canal are very clearly demonstrated. Numerous measurements made by Politzer on horizontal sections showed that the distance from the antero-superior part of the outer surface of the mastoid process (the seat of operation in opening of the antrum) varies between 6 and 15 *mm.* The varying situation of the sinus in relation to the external surface of the mastoid process and posterior wall of the external auditory canal is shown on numerous sections. In a proportion of cases "the groove of the sinus is found considerably deepened, strongly curved, and in its middle and upper portions arched so far outwards and forwards, that between it on the one side and the posterior wall of the meatus, as well as the external surface of the mastoid on the other side, merely a narrow bridge of bone is present." This relation of the sinus, so unfavorable for operating, is chiefly met with in temporal bones with

a diploëtic or sclerotic structure. The author also very properly emphasizes the importance of the relation of the mastoid cells to the incisura mastoidea in view of the occasional escape of pus into this incisura, with burrowing of the pus under the sternomastoid muscle and fascia of the neck.

The preparation and dissection of the osseous and membranous labyrinths are described minutely. These sections are beautifully and clearly illustrated. In this connection details are given of the difficult task of exposing and examining the two interesting ducts which connect the labyrinthine cavities with the cranial cavities, namely, the aquæductus vestibuli (ductus endolymphaticus), and the aquæductus cochleæ (ductus perilymphaticus). Interesting historical references are given regarding their discovery. These ducts are most easily exposed on decalcified temporal bones or by the corrosion process.

A series of valuable preparations are described specially for instruction purposes. One of these is a frontal section through the entire skull and brain (firmly frozen), in the frontal plane of the two external meatuses. The study of such a section is important, in view of the operative treatment of otitic cerebral abscess. Politzer gives the various diameters of the temporal lobe above the middle ear as measured by him on several preparations of frozen sections of the skull and brain.

A valuable chapter is that devoted to the preparation of casts of the cavities of the ear by corrosion. Although this process has been practised since the beginning of the century, it has lately been brought to the front by Bezold in his treatise *Die Corrosions-Anatomie des Ohres*, München, 1882. The process, by boiling in wax and resin and then decalcifying with hydrochloric acid, yields excellent casts. In order to render those casts more capable of resistance, Politzer has devised a plan of covering them with a galvano-plastic layer of copper. In this way beautiful casts are made of the labyrinthine cavities. The metallic casts are, of course, most suitable for demonstration. The various alloys are here described, and the details of the process are so carefully gone over that any one may be able, after some practice, to prepare for himself most interesting and instructive casts.

The histological examination of the ear (oto-histology) receives all the attention which its importance and difficulty demand. The processes of fixing and hardening, of decalcification, of embedding

and sectioning, of staining and mounting, are described in great detail. For fixing and hardening, chromic acid and its salts are preferred. Urban Pritchard's fixing fluid, composed of chromic acid, alcohol, and water, is recommended as suitable. Decalcification of the petrous bone is a most important preliminary to sectioning, and the other processes of histology. Politzer prefers nitric acid ($3\frac{1}{2}$ parts of nitric acid, $\frac{3}{4}$ of a part of chloride of sodium, and 100 parts of water) as the best decalcifying agent. This solution should be used in large quantities and should be renewed every day. An alcoholic solution of hydrochloric acid is good, if the object is only to obtain topographical sections, but, on account of its injurious action upon the labyrinthine structures, this acid is not suitable for histological examination. For embedding the structures suspended in the cavities of the temporal bone before section, no substance is so efficient as celloidin, dissolved in absolute alcohol and sulphuric ether. When it sets, this solution completely surrounds all the tissues and retains them *in situ*. For sectioning, Politzer makes use of the automatic sliding microtome of Reichert, of Vienna. The staining methods preferred by Politzer are carmine, eosin, and hematoxylin. For staining bacteria on sections he recommends Löffler's "universal bacteria staining" method. By this process the sections, after being perfectly freed from acid, are left for five or ten minutes in an alkaline solution of methylene blue.

After going over all the general processes connected with otology, the author takes up the various parts of the ear in order, beginning at the auricle and ending at the central course of the auditory nerve in the brain. In each case he describes with great detail the normal and pathological histology. His most difficult task is the histological examination of the membranous labyrinth. The preparation of good microscopic sections of this most intricate part of the ear requires very great experience, and it is very properly recommended that, at first, the organs of hearing in the lower animals, such as in young guinea-pigs, should be employed. Immediately after the death of the animal the organ should be placed in the chemical fluids necessary as preparations for the sectioning. In regard to the histological examination of the terminal apparatus in the cochlea, the most instructive sections are those through the modiolus from base to apex, and those directed vertically to the long axis of the modiolus. These should be examined with a lower power, in order to see well the two *scalæ*,

cochlear canal, and the terminal apparatus of the auditory nerve. For the details of Corti's organ, a higher magnifying power is necessary.

The volume concludes with a very complete and valuable account of the literature of the subject. The illustrations, consisting of 164 wood-cuts and one plate, are numerous and most helpful. These illustrations, in very many cases, depict specimens taken from the author's own collection.

A most important service has been performed by Mr. Stone in placing this work before his English-speaking *confrères*. The task undertaken by him in its translation into English was no easy one, when we consider the technical character of the subject, and the difficulty of avoiding errors in the numerous details and measurements. The task has been well executed, and Mr. Stone deserves the grateful thanks of all those interested in the study of otology for the labor and time which he must have expended upon this translation.

THOMAS BARR.

Textbook on Otology. By Dr. F. ROHRER, of Zurich. Published by Deuticke, Leipsic and Vienna. 1891. Reviewed by A. BARTH, Marburg. Translated by Dr. MAX TOEPLITZ, New York.

The textbook is industriously and, in spite of its abundant contents, concisely written. Differences of opinion are thus less marked. On the other hand, the style of writing is more adapted to those who do not intend to enter too fully into the details of otological study. The value of the book will not be detracted from by emphasizing a few points which might be corrected. The representation of the methods of examination appears to the expert somewhat pedantic. Their execution would require an infinite amount of time and labor. This refers also to the tables appended to the work, according to which histories should be written. I prefer to get the full history (p. 32) after the objective examination. I would advise the illumination with reflectors *before every* introduction of instruments. In examinations with the tuning-fork, a more distinct statement of the tones would make the matter clearer. A large number of the drawings of the membrana tympani might be somewhat less schematic in the outlines of the malleus. The drawing of Lucae's catheter is not exact. The illustration representing the atrophy of the membrana tympani is not clear (p. 110). I should not like to endorse the following sentence: "The membrana tympani is not elastic, but firmly and rigidly stretched"; and I should not speak of the

proper tone of the drum-membrane. The statement that the air conduction of sound takes place in atresia of the external meatus through the Eustachian tube (p. 79), is at variance with the author's views upon abnormal patency of the tube (p. 176). The Burckhardt-Merian cotton applicators cannot be recommended, because they are much too long. Lucae's water balloon¹ and Lucae's olive-shaped attachment to Politzer's bag are practical and worthy of consideration. In the treatment of eczema (p. 71), moisture is possibly to be avoided, or the parts should be well dried after cleansing, or dry treatment and ointments are to be used. In the latter treatment, grease or lanolin should be added, since pure vaselin is frequently irritating. In applications of ice to the external ear (p. 73), I would add some precautions, since the cold frequently cannot be borne, and the auricle may be frozen. Pyoktanin is an unreliable and irritating disinfectant. Cocaine seems to be too frequently recommended; its action through the intact cutis is quite doubtful; its prolonged use in swellings for treatment is without effect and frequently harmful. On the other hand, I have seen good results from its use in acute irritation of the nose and middle ear, when applied temporarily for a few days upon the nasal mucous membrane. In the treatment of circumscribed otitis externa (p. 88), I would have expected, instead of the unreliable menthol, rather the plugging with aluminium aceticum (or a 1 per mille solution of sublimate) as the most efficacious method. I would not permit the patient the use of a wiper or even of an ear-sponge (p. 88) for cleansing, this not being in accordance with the before-mentioned difficulty of disinfecting instruments. Whether the discharge is to be considered as "*exudation ex vacuo*" (pp. 107 and 173), is very doubtful. The reviewer thinks the posterior dulness in the intermediary zone of very rare occurrence. The most frequent seat of dulness is at the margin of the membrana tympani and around the umbo. For the explanation of the frequency of otitis media in infancy (p. 124), most authors mention in the first place the processes of degeneration. With reference to the treatment of carcinoma, (p. 161) the radical operative removal is worthy of mention, so long as it can be carried out. I generally agree with the author's views on cholesteatoma, but I do not understand why out of consideration for some authors it should be given a duplex character. In perforations in Prussak's space, or in Shrapnell's membrane (p. 167), the seat of suppu-

¹ *Arch. f. Ohrenheilk.*, vol. xx, p. 167.

tion is frequently separated from the tympanic cavity proper, so that paracentesis at the lower margin of the membrana tympani does not facilitate the discharge of secretions. The very brief description of the naso-pharynx and its affections necessitates a reference to other textbooks on the subject. The operative opening of the mastoid process (p. 182) is very briefly dispensed with. The reviewer, in contradistinction to the author, appears to believe that this operation, with its after-treatment, belongs rather to the province of the aurist than to that of the general surgeon. The influence of quinine and salicylic acid upon the inner ear is occasionally mentioned, but it deserves a fuller discussion because of its not rare occurrence. I feel obliged to emphasize again that diplacusis (p. 215) is due at least in the majority of cases to affections of the sound-conducting apparatus, and that double hearing is only hearing in a different timbre.

The foregoing remarks treat only of the more important points that struck me in reading. They are, however, as I emphasize again, not directed against the book as a whole. I am rather convinced, that the book answers its purpose completely, and is to be highly recommended to the student as well as to the general practitioner. If I may express a desire, I should not like to have later editions larger, but rather, if possible, more abbreviated. On the other hand, on account of its conciseness, a complete bibliography would be welcome to many readers.

Microphotographic Atlas of the Normal and Pathological Anatomy of the Ear. By Dr. L. KATZ, Berlin. Published by Hirschwald, 1891. Reviewed by S. MOOS, Heidelberg. Translated by Dr. MAX TOEPLITZ, New York.

"The atlas will be published in three parts, which will contain photographic illustrations of the most important pathological conditions of the hearing organ, and also the normal histological conditions of the ear, which are partly still subject to controversy." The first part, already published, contains ten photographs. The three first represent Corti's organ in the cat and dog with its annexes and details, the fourth a transverse section of the stapes and vestibule of the rabbit, the fifth a stapedial ankylosis in man, the sixth a new formation of bone (probably after a trauma in childhood) in a cochlear turn with atrophy of the acoustic nerve in the cochlea, the seventh a longitudinal section through the ampulla of a cat, the eighth the lamina reticularis of the cat with both rows of rods, the ninth the pathological condition of the labyrinth with stapedial ankylosis in a deat-

mute boy, seven years old, and the tenth the pathological condition of a semicircular canal in a deaf-mute.

This number is excellent as regards most of the illustrations. The method gives, topographically, at any rate, the best results. As to *finer cellular* details, some illustrations are excellent; this depends, of course, on the thickness of the sections. The illustration of the crista of the cat, for example, leaves much to be desired in the details of the nervous epithelium. The author and the publisher deserve, at any rate, great credit for the enterprise. Photography will not entirely replace lithography. We recommend the work very highly to our special colleagues.

MÜLLER: **Lip-Reading—A Guide to the Study of the Art of Reading Spoken Words from the Mouth.** 160 pages. Hamburg: Published by the author (Hansaplatz 2). Reviewed by S. MOOS, Heidelberg. Translated by Dr. MAX TOEPFLITZ, New York.

This work is not adapted, as the author himself emphasizes, for the personal use of the deaf, but is a guide for teachers in institutions for deaf-mutes, or for those who instruct deaf-mutes, or for deaf persons, who desire to learn to read the spoken words from the mouth. The first part of the book contains the following subdivisions: Instruction in lip-reading for deaf-mutes, the position of the deaf in the method of instruction for deaf-mutes, the instruction in lip-reading suitable for persons with difficulty of hearing, and the method of speaking before the pupil. The remaining part contains exercises. We may gratefully accept this work offered by a layman, since it completely fulfils the promises given in the title.

MISCELLANEOUS NOTES.

The co-editor of these ARCHIVES, Dr. MOOS, has received the title of honorary professor in the University of Heidelberg.

For the cultivation of aural science and art **The New York Otological Society** (private; membership limited; meetings at the houses of the members, with a social finale) has recently been organized in New York City. Four meetings annually, viz., on the third Tuesday of November, January, March, and May. On the day of its organization the Society counted twenty-nine members, and elected, for the present year, Dr. Albert H. Buch, President, Dr. E. Grüning, Vice-President, Dr. E. B. Dench, Secretary.

NOTES FROM GREAT BRITAIN.

SOCIETY MEETINGS.

MANCHESTER MEDICAL SOCIETY.—At the meeting held on November 4, 1891, Dr. Milligan read a paper upon the treatment of attic suppuration by excision of the auditory ossicles. The paper subsequently appeared in the *Lancet* of January 16th, and an abstract of it will be found in our Report of the Progress of Otological Science.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—At the meeting held on November 6, 1891, Dr. Thudicum read a paper "On the Entrance of Polypi of the Ethmoid Cavity into the Orbit and Antrum, and their Progress in the Train of Ethmoid Abscess."

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—At the meeting of January 8, 1892, Mr. Richard Lake exhibited microscopical sections of aural polypi.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—"On Cystic Tumors of the Throat, Nose, and Ears," a paper read by Dr. P. McBride at the meeting of December 2, 1891.

MANCHESTER PATHOLOGICAL SOCIETY.—Wednesday, December 9, 1891. Dr. Milligan showed an interesting specimen from a case of meningitis following chronic suppurative middle-ear disease. The mastoid antrum had been opened and scraped, but the patient, a boy aged seven, died ten hours after the operation. At the post-mortem pus was found in abundance at the base of the brain, over a portion of the left cortex, and along the sheath of the auditory nerve.

NEWCASTLE-ON-TYNE CLINICAL SOCIETY.—At the meeting of Thursday, November 26, 1891, Dr. W. Robertson showed, among other cases, two of mastoid disease.

BRITISH MEDICAL ASSOCIATION, ABERDEEN, BANFF, AND KINCARDINE BRANCH.—A meeting of this branch was held at Aberdeen on November 18, 1891. Dr. Mackenzie Booth showed a case in which he had opened the mastoid antrum with the chisel. The patient, a girl aged ten, was suffering from mastoid abscess; the symptoms were relieved immediately, and the patient was well in a fortnight.

BRITISH MEDICAL ASSOCIATION, BIRMINGHAM AND MIDLAND COUNTIES BRANCH.—At the meeting of this branch on January 28th, Mr. Heaton showed a case in which there was congenital malformation of the right ear and lower jaw. The external meatus was absent, but there was some evidence of the existence of a middle and internal ear; the auricle was represented by two small nodules in front of the depression in the skin which marked the position of the meatus.

LONDON POST-GRADUATE MEETINGS.—On January 21st, at the London Throat Hospital, Great Portland Street, Mr. W. R. H. Stewart gave a demonstration on the examination of ear cases.

On January 28th, at the same institution, Dr. Edward Law demonstrated the examination of throat and nose cases.

On February 18th Mr. Stewart lectured on some complications of chronic middle-ear suppuration.

CANADIAN MEDICAL ASSOCIATION.—This association held an enthusiastic meeting in the autumn of last year. At that meeting Dr. Proudfoot read a case of occlusion of the auditory meatus by hyperostosis, and Dr. Stirling one on cerebral abscess following mastoiditis, in which he had operated with complete success.

APPOINTMENTS.

BARRETT, J. W., M.B., B.Ch. [Melb.], F.R.C.S. [Eng.], has been appointed assistant surgeon to the Eye and Ear Hospital, Victoria, South Australia.

RYAN, J. P., L.R.C.P., L.R.C.S. [Ireland], has been appointed surgeon to the Eye and Ear Hospital, Victoria, South Australia.

BULL, W. C., M.B. [Cantab], F.R.C.S. [Eng.], has been appointed aural surgeon to St. George's Hospital, in the place of Sir William Dalby, resigned.

SHAW, C. E., M.A., M.D. [Ireland], has been appointed surgeon in charge of the Eye, Ear, and Throat Department of the Ulster Hospital, Belfast.

BEQUESTS.

Under the wills of the Brothers David and Francis Smith of Glasgow, a sum of £10,000 has been distributed among the local charities. The Glasgow Ear Hospital receives £100.

The late Mr. Newbon of Islington, the senior member of the firm of auctioneers and valuers, bequeathed large sums of money to the local and metropolitan charities; the Central London Throat and Ear Hospital receives £1,000.

The Royal Ear Hospital of London has received a legacy of £100, under the will of the late Mrs. Amelia Ballard.

MISCELLANEOUS.

A new department for the treatment of diseases of the eye, ear, and throat has been established in connection with the Ulster Hospital, Belfast, to which Dr. Cecil Shaw has been appointed.

In addition to his ordinary course on aural surgery, Dr. Thomas Barr has this session given three lectures in Professor Sir George Macleod's course on systematic surgery.

In a letter to the *British Medical Journal* of December 5, 1891, Mr. A. H. Tubby suggests a plan for correcting the deformity due to outstanding ears. He removes a piece of skin from behind the ear, divides and grooves the cartilage of the concha, and then draws the opposing raw surfaces together by means of two or three deep sutures.

A general practitioner, writing to the *Lancet* of January 2d, warns us against a possible danger that may arise from the use of badly constructed binaural stethoscopes. Quoting his own case as an example, he tells us how, by the accidental slipping off of one of the ivory ear-pieces, the unguarded end of the metal tube was thrust forcibly through his membrana tympani, with results that all aural surgeons may readily imagine.

By the much regretted resignation of Sir William Dalby, the authorities of St. George's Hospital have lost the active services of one of the most able and successful aural surgeons in London, and the medical school one of their most charming lecturers. The vacancies thus created have been filled by the appointment

of Mr. Bull, while by a graceful compliment on the part of the committee Sir William Dalby himself has been unanimously recommended for appointment as consulting aural surgeon.

Among the new instruments connected with aural surgery which have recently been introduced may be noted : (1), a combined nasal, aural, and ophthalmic speculum, figured by Mr. G. H. Wade in the *Lancet* of November 14, 1891 ; (2), an improved tonsil guillotine described by Dr. Morison in the *British Medical Journal* of January 16th ; (3), an improved aural speculum and head-rest described by Dr. Ward Cousins in the *British Medical Journal* of January 16th under the head of an "Improved Method of Examining the Auditory Canal and Membrana Tympani" ; (4), a pair of nasal scissors designed by M. W. J. Walsham on the principle of the ordinary "crocodile" forceps, figured in the *Lancet* of February 13th.

"Soft Papilloma of the Ear of Suspected Infectious Origin." This is the title of a short note by Mr. Richard Lake in the *Lancet* of January 9th, in which he gives an account of an interesting case that had recently come under his notice. The patient was a girl of seventeen with a history of purulent discharge from the ear of some years' standing, and in whom three papillomas were discovered, attached respectively to the tragus, the anti-tragus, and the concha. Their infective nature was suggested by their appearance, by the character and odor of the discharge, which was very similar to that seen in gonorrhœal warts, and by their relative position, the growths of the tragus and anti-tragus being obviously secondary to the one on the concha.

Sir William Dalby, in a short note to the *Lancet* of February 20th, summarizes his experience as to the effect of influenza upon the middle ear. He finds that while primary affections of that organ are comparatively rare under these circumstances, it is, on the other hand, the rule rather than the exception to see exacerbations of pre-existing inflammatory mischief, or even the lighting up of long-dormant middle-ear trouble.

Among other contributions to aural literature may be noted an article upon adenoid growths of the naso-pharynx in children, their effects and treatment, in the *Canada Lancet* of December, 1891, and a paper on the same subject by Mr. Marsh in the *Birmingham Medical Review* for November, 1891.

Ulster Eye, Ear, and Throat Hospital.—At the twenty-first annual meeting held on February 15th, it was announced that 179 in-patients and 1,336 out-patients had been treated during the past year. Clinical instruction is now given to the students of the Belfast Medical School.

The thirty-fifth annual meeting of the Bradford Eye and Ear Hospital was held on February 20th, when a very satisfactory report was presented to the subscribers, both in respect to the work done by the charity, and also with regard to its financial position. The number of new patients was 4,113, of in-patients, 517, while the income for the year exceeded the expenditure by upwards of £200.

OBITUARY.

It is with regret that we record the death, on February 3d, of **Sir Morell Mackenzie**. Although at the last his death occurred somewhat suddenly, it cannot be said to have come altogether as a surprise, for it was well known to his friends that his was precisely the constitution in which an attack of influenza, the malady to which he practically fell a victim, gave rise to the greatest anxiety, and called for the most serious and guarded prognosis. A great, one might almost say a tremendous worker, his physical powers were by no means commensurate with his mental activity, and of late years especially he had developed a tendency to these bronchitic troubles, for the relief of which he made repeated journeys to the Mediterranean and other health resorts.

Sir Morell Mackenzie's contributions to the literature of his subject are too numerous and too well known to give in detail, and their value is indicated by the frequency with which his opinions are quoted, and in the majority of instances confirmed; his was essentially "the pen of the ready writer," for he possessed the somewhat rare faculty of presenting his views in an extremely lucid and attractive manner, consequently such works as his "Diseases of the Throat and Nose" will probably long rank as classics in his particular department of practice.

But in addition to his professional attainments, Sir Morell Mackenzie had a singularly charming manner, so that it is hardly surprising that his success should have been rapid and complete, and that his death will be regretted by a very large circle of personal friends. He was buried at Wargrave on February 8th.

Recent controversies are still so fresh in the memory of the

present generation as to render it almost impossible for us to form an accurate or even a just estimate of the position which will subsequently be assigned to Sir Morell Mackenzie in medical history. In this country, as the pioneer in the study of diseases of the throat and nose, his position was unique, and there can be no doubt that his claim to be considered the leading laryngologist and rhinologist of his day can never be seriously disputed. That his general position in the world of medicine was not such as might have been expected in one of his decided ability, was due rather to the unacceptable character of his views upon matters of professional etiquette and such subjects, than to the existence of any doubts as to his skill.

ARCHIVES OF OTOLOGY.

A CASE OF THE SO-CALLED BEZOLD VARIETY OF MASTOIDITIS. OPENING OF MASTOID. CRANIOTOMY. DEATH. AUTOPSY. ABSCESSES IN TEMPORAL LOBE AND CEREBELLUM. SINUS THROMBOSIS ON THE OTHER SIDE.

By H. KNAPP.

THE case with the above title is one of the most important and instructive that ever occurred in my aural practice. I think a detailed record of it may be as interesting to the reader as its observation has been to me. It is as follows:

Mary M., twenty-five years old, of New York City, consulted me September 25, '91, with the symptoms of an acute middle-ear catarrh on both sides.

She stated that she had had no ear disease in childhood, nor was deafness hereditary in her family. The last year she had frequently suffered from severe colds in her head which caused earache on sneezing. In September, 1891, she was in Central Park, lay on the grass, felt cold (being in the sixth month of pregnancy), got a violent earache, and was deaf in both ears for three days.

I found both drumheads and the walls of the inner portion of the right ear-canal, red, swollen, and coated with scales, presenting, like the drumhead, a sodden appearance. The pharynx was fairly normal.

$h = \frac{c}{24}$; $v = \frac{3}{80}$; after Politzer's inflation $v = \frac{3}{80}$, each.

I ordered her to bathe the right ear-canal with warm soap water, and syringe it with plain warm water; further to put a leech behind each ear, rest in bed the greater part of the day, and take good care of herself.

I saw her no more for four months. On Jan. 17, '92, she came again, telling me that after the consultation in September she had improved for four weeks, then the skin behind the right ear had

been swollen, red, and painful, but there had never been any discharge from the ear. The painful swelling behind the right ear had disappeared again. Dec. 23, '91, after having been out in the evening she had had earache and intense headache, loss of appetite, and dizziness in attacks lasting about five minutes. These symptoms had disappeared but the headache had remained constant. She was confined Jan. 5, '92; the delivery passed normally, but she had excruciating headache. After the confinement the headache abated for a short time, but then it returned and so did swelling behind the ear, and extended down the neck. Her physician incised it Jan. 17th, liberating a large quantity of pus. The headache was not diminished. Pus came from the wound every day, the swelling almost disappeared. During the last three weeks she had been worse again, suffering from headache, nausea, vomiting (one day), and dizziness, more in the night than during the day, depriving her of sleep.

I found the left ear normal, the inner portion of the right ear-canal still swollen and red, the upper-posterior part bulging; the drumhead red throughout. No discharge in canal. The mastoid region was red, swollen, hard, tender to the touch. The swelling was most marked behind and below the tip of the lobule. It extended $1\frac{1}{4}$ " behind and $1\frac{1}{2}$ " below the ear down the sterno-cleido-mastoid muscle. Pressure brought out thin pus through the wound. A probe could be introduced 2 *cm* into the opening; it passed the end of the tip of the mastoid without entering the cells, or touching rough bone. Percussion of the skull was not painful.

From the symptoms and the course of the disease I concluded that the acute aural catarrh had disappeared in the left ear, but developed in the right into the so-called Bezold variety of mastoiditis, viz., the pus had made its escape through an opening on the medial side of the tip of the mastoid into the digastric groove and the head of the sterno-cleido-mastoid muscle. Knowing from literature and personal experience that in this form of mastoiditis there is a tendency for perforation not only on the medial side of the tip, but also on the posterior wall of the ear canal, the upper wall of the tympanic attic bordering the middle cranial fossa, and the medial table of the mastoid bordering the posterior cerebral fossa, I advised an immediate operation,

which was, to consist in an extensive opening of the mastoid process as a first step.

The patient consented and the operation was performed in the operating room of the N. Y. Ophthalmic and Aural Institute, Jan. 29, '92.

OPERATION. An incision, 7 *cm* in length, was made from the head of the sterno-cleido-mastoid muscle up, 0.5 to 1.0 *cm* behind the auricle. Only in the lower part the tissue was infiltrated with serum and some blood, higher up it appeared healthy. The chiselling, into healthy-looking bone, was begun at the usual place, 1 *cm* behind the upper wall of the auditory meatus. Pus escaped when the antrum was reached. The opening made reached from the base to the tip, 2.5 *cm* in length and 1 *cm* in breadth. It was washed out with corrosive sublimate, 1-5000, and packed with corrosive sublimate gauze.

Jan. 30th.—Swelling of head of mastoid disappeared. No discharge. Pulse 100. Temp. 100.4° F. (38° C.).

Jan. 31st. Morning: Temp. 99. 2° F. No pain, no discharge. Pulse better. *Evening:* Temp. 102°, some headache. She did not complain of the ear, but had got a pleuritic effusion on the right side. The temperature varied from 99° to 101.8°. She was seen by Dr. W. H. Draper, in consultation, who examined her carefully, gave a good prognosis, advised a blister locally, digitalis and acetate of potash internally. The effusion disappeared in twelve days, and the patient was discharged from the hospital, *Feb. 13th*, fifteen days after the operation. The swelling at the head of the sterno-mastoid muscle had disappeared, the discharge from the wound at that place had ceased immediately after the operation. The wound had been syringed gently and drained by means of a perforated silver tube. $h \frac{5}{24}$; $v \frac{3}{8} +$.

For a week she felt very comfortable, then complained again of headache. No fever, no nausea.

Feb. 28th—I saw her at her house and visited her regularly every few days until her death. Her headache being intense, but no discharge from the wound, and no fever being present, I largely reopened the wound in the mastoid and inserted a silver tube, but there was no pus and the probe felt the inner plate of the bone unbroken everywhere. $h \frac{2}{24}$, $v \frac{3}{8} +$. Percussion of the skull showed no painfulness to-day, nor, I may state here, on any other day of her illness.

March 1st.—Headache less, not localized, and not limited to right hemisphere. Interior of mastoid scraped with sharp spoon, no dead bone, granulations, or pus. No discharge from ear, some wax in external auditory canal. Interior of eyes normal.

March 14th.—Had intense headache at times, then was free from it again. On the evening of the 12th she had been very gay with her sister, then suddenly she had a headache, her speech was impeded, she grew drowsy, lost her appetite, and has remained so. When I saw her she had no fever and could not be roused. In the upper part of the *left* sterno-cleido-mastoid muscle, chiefly on its medial side, there was a hard swelling, two inches in diameter. Left ear and mastoid normal. No optic neuritis. Takes no nourishment. Cavity of right mastoid kept open by silver-tube, nothing can be scraped out with sharp spoon, the inner bony wall unbroken. Right ear, mastoid, and surroundings free from irritation.

March 15th.—Speaks some. Pulse 88, temp. 100.2°. Swelling on neck, below *left* ear, less.

March 17th.—Pulse 72, temp. 98.4°; speaks some, but does not hear. Swelling on left side of neck almost disappeared. Appetite good. Complains of headache, is more or less in a stupor, but can be roused.

March 20th.—The swelling of left side of neck disappeared. She felt better every day, had no fever, talked some, yet was drowsy; since last night more so; has a vague, staring look; does not speak. Pulse 60, temp. 99.5°. Both optic discs congested, slightly swollen, their margins somewhat covered.

The continuance of the headache, stupor, loss of appetite, vomiting, impediment of speech, the slow pulse, the temperature varying between 99° and 101°, and the beginning of optic neuritis appeared to me sure signs of a severer lesion than meningitic irritation, but I was unable to discriminate between purulent meningitis, extradural supuration, and cerebral or cerebellar abscess. Several neurologists, who were kind enough to see the case with me, would not either venture on a special diagnosis. Considering meningitis as the least probable of the above-mentioned lesions, I advised to open the skull and search for an abscess, either on the outer side of the dura mater or in the brain. The mother and relatives did not consent.

March 29th.—The same symptoms have continued. She could be roused from her stupor, spoke coherently but laboriously, dropping letters. The swelling at inner side of head of left sterno-mastoid distinct again ; hard ; was thought to be a gland. Ear and mastoid healthy. Patient refuses nourishment, vomits what she tries to eat.

Up to *April 4th* there was no material change. Headache, stupor, vomiting, imperfect speech, loss of appetite, pulse varying from 60 to 70, temp. from 99° to 100°, optic neuritis marked though moderate. The treatment—cold applications to head, bromides, quinine in moderate doses, milk punch, etc., to sustain her as much as possible—had no lasting effect. The mother and relatives were tired out, and when I told them that, in my opinion, without an operation she was sure to die, with an operation probable to die, and that even under these circumstances I was still willing to operate, if they consented, they no longer refused, but asked me to do it.

The OPERATION was done in the patient's house—Drs. W. A. Holden, A. Duane, C. H. May of New York, and Dr. C. M. Ball of Keokuk, Ia., being present and assisting—April 5, 1892, under such antiseptic precautions as were possible. My plan was to open the posterior cranial fossa in order to see whether there was an extradural abscess or thrombosis of the lateral sinus ; if not I intended to chisel away the posterior wall of the ear-canal and penetrate into the middle cranial fossa.

The regions behind and above the ear, having previously been shaved, were washed with soap and bichloride of mercury, $\frac{1}{2000}$. A large incision through the old wound and the soft parts covering the mastoid was made, the periosteum on the whole extent of the mastoid detached, and the auricle on the posterior and upper side was dissected off the bone. The whole anterior surface of the mastoid was then chiselled away, the cavity emptied, and by careful chiselling also the inner table of the mastoid was removed to the extent of 12 by 8 mm (as you see at the specimen). No pus ; the dura mater and lateral sinus lay bare and appeared healthy, both to feel with the probe and to inspection as far as this was possible.

I now began to chisel forward in order to penetrate into the tympanic attic, but soon the patient grew pale and stopped breathing. She rallied on hypodermic injections of alcohol and artificial respiration, which had to be continued to the end of

the operation. By chiselling along the postero-superior wall of the auditory meatus, I could introduce a probe into a cavity which (correctly) I considered to be the attic. Not finding any pus there, I determined to penetrate into the cranial cavity by enlarging the canal, which I had chiselled into the bone, but finding on my way such hard and massive portions of bone, I desisted and changed my plan. After enlarging the opening in the integument of the mastoid by an incision curving forward and above the auricle, I easily chiselled a hole through the squamous portion of the temporal bone, 1 cm above the zygomatic process of the temporal bone, $1\frac{1}{2}$ to 2 cm in diameter, directly above the external meatus. The zygomatic process could be easily felt after freeing the bone from the soft parts and even well enough before this. There was no pus. The healthy-looking, not pulsating dura mater was split, the pia and superficial layer of the brain were incised, and as both also appeared healthy I gave the operation up as hopeless.

The progress of the operation having shown that there was neither meningitis, nor an extradural suppuration, nothing but an abscess in the brain substance seemed to be left, but in the exceedingly feeble and critical condition of the patient, I shrank from thrusting a knife or a syringe-trocar into the temporal lobe in search for an abscess which might have been in some other part of the brain as well as there.

I carefully washed and syringed the wound out with $\frac{1}{2}\%$ bichloride solution, packed it with sublimate gauze, and applied an antiseptic dressing. The artificial respiration was continued $\frac{1}{4}$ h. longer, and when we left it off we had the pleasure to find that the pulse became stronger, the color of the face less pale, though the breathing was superficial. The pleasure did not last long; in $\frac{3}{4}$ h., before I had left the house, the patient died.

The AUTOPSY was made twenty hours after death, Drs. Holden, Bailey, and Ball assisting. The skull was opened in the ordinary way. Nothing essentially morbid was found on the convexity of the brain. On the tentorium cerebelli there was some puriform liquid. After removal of the brain, the *right lateral sinus* was found filled with dark, clotted blood, in its portion opposite the operation-wound

in the mastoid and its vicinity. Farther backward toward the torcular Herophili, however, the contents of the lateral sinus became puriform. At the torcular all the confluent sinuses were filled with creamy pus; the longitudinal sinus in particular and the *left* lateral sinus were tightly filled, and evacuated large quantities of pus on being cut. The suppuration continued into the *left* internal jugular vein and when we pressed on the swelling under the upper part of the left sterno-mastoid muscle the pus welled out through the foramen lacerum into the posterior cranial fossa.

On examining the *meninges* of the brain the dura showed no abnormality anywhere, but the pia over the right temporo-sphenoidal lobe and the right cerebellar hemisphere was somewhat milky here and there, and on picking up and tearing some of its small veins they were found to be filled with pus.

Underneath this infiltrated pia there was a thin layer of healthy *brain* substance, but on making successive cross-sections through the brain, *two abscesses* were opened, both containing thin, white, somewhat greenish pus. The one was in the right temporal lobe, the other in the right cerebellar hemisphere, directly opposite the operating defects in the cranial bones. The abscesses were each about the size of a walnut, their walls soft and ragged, not hardened like the so-called pyogenic membrane. The other parts of the brain showed nothing noteworthy; in particular I may mention that the ventricles contained no more than the ordinary amount of transparent liquid. The pieces of brain containing the abscesses and the right temporal bone were removed, taken to the laboratory of the N. Y. Ophthalmic and Aural Institute, where I examined them at once. Of both abscesses I made dry-cover specimens and cultivations in gelatine and agar, of which hereafter.

The *temporal bone* was freed from its soft parts and the walls of the mastoid process carefully investigated. The defect made by the operation went through the transverse sulcus, just in the right place for opening the lateral sinus, if thrombo-phlebitis had been found.

On the *medial wall of the tip of the process* there was a

small but distinct perforation of the bone, leading into the digastric groove (I have passed a silk thread through it in the specimen), verifying the diagnosis of the Bezold variety of mastoiditis.

By the second operation a free communication had been made between the mastoid cavity and the tympanic attic, chiefly by enlarging the antrum, but a portion of solid bone between the antrum and the auditory canal, the inner end of the postero-superior wall of the bony meatus, had been left.

The whole tympanic cavity, but especially the attic, was densely *packed with granulating tissue*, so that after the removal of the drum membrane the ossicles had to be searched for in the exuberant mucous membrane. They were found in their proper place and healthy. There was no caries in any part of the walls of the tympanum.

The *microscopic specimens* made from the cerebellar abscess showed no micro-organisms, and all the cultivations taken from it were sterile. The specimens from the abscess in the temporal lobe showed a multitude of cocci, and in some places many small bacilli. Of the cultivations two, by their form and liquefaction of the gelatine, appeared to be *staphylococcus albus* and *aureus* (one turned yellow), and the microscope verified the appearance; in one tube, however, there was a mixture of staphylococcus with a short, very distinct *bacillus*, whose breadth was about one third and whose length about double the diameter of a coccus.

RECAPITULATION.

If we recapitulate the history of the foregoing case, we find a young woman of a good constitution suffering, during the course of a year, from repeated attacks of acute naso-pharyngeal catarrh extending into both ears. The left ear recovered. The fourth and later attacks showed implication of the right mastoid with marked meningitic irritation. She was pregnant and during the last months the attacks were more severe. The upper part of the sterno-cleido-mastoid muscle became red, swollen, and painful; ten days after her confinement her physician made a deep inci-

sion into the swollen head of the muscle, liberating a good deal of pus. The relief being only temporary, I opened the mastoid from its base to the tip, found pus in the upper part, and kept the wound open by a perforated silver tube. The patient felt relief, but soon had a pleuritic exudation as an intercurrent disease, which disappeared in less than two weeks. Discharged from the hospital as cured, she felt well for two weeks, then symptoms of cerebral irritation returned and with varying intensity lasted until her death, three months later. These symptoms were: persistent headache, nausea, occasional vomiting, dizziness, stupor, impediment of speech, loss of appetite, constipation. The pulse at first varied between 70 and 88, later sank to 60 per minute; the temperature varied between 98.4° and 100° never rapidly changing. There were no convulsions, deliria, chills, or abnormality of sensation. The ear never gave her any more trouble, and there never was any discharge from the ear-canal, though the drumhead and adjacent portion of the ear-canal were red and bulging. Two months before death a sudden swelling was noticed below the head of the other (the left) sterno-mastoid muscle. It varied in size, but never disappeared entirely. The left ear remained healthy. The eyes examined with the ophthalmoscope were found healthy until the last months when the development of optic neuritis could be distinctly watched. The extension of suppurative ear disease to the brain being diagnosed, craniotomy was advised, but not consented to until a day before her death.

The operation was made at the patient's house. The opening in the mastoid was enlarged, and extended into the cranial cavity, by an opening 3 *cm* by 2 *cm*. Dura mater and lateral sinus found healthy. Then the wound was extended into the tympanic attic, by enlarging the mastoid antrum and removing part of the posterior wall of the ear canal with the chisel. No pus being found in the tympanic cavity and the bone being thick and hard, the middle cranial fossa was opened by chiselling a hole, 2 *cm* in diameter, through the squamous portion of the temporal bone beginning 1 *cm* above the ear-canal. No extradural sup-

uration being found, the dura mater and the superficial layer of the brain were incised, but found healthy. In the course of the operation the patient became pale and breathless. She was sustained by hypodermic injections of alcohol and by artificial respiration, the latter being kept up until the end of the operation. On account of her feeble condition I desisted from making exploratory incisions or punctures into the brain substance, considering the case then as absolutely hopeless. After the operation, even after the discontinuance of the artificial respiration, she rallied, for three-quarters of an hour, but then suddenly collapsed and died.

The *autopsy* showed (1) a perforation in the medial bony surface of the tip of the mastoid process, verifying the diagnosis of Bezold's variety of mastoiditis; (2) upper part of the tympanic cavity densely filled with granulation tissue, but free from pus; (3) the right lateral sinus (that of the diseased ear) healthy, but filled with dark clotted blood; (4) the dura healthy throughout; (5) the pia of the right temporal lobe and the right cerebellar hemisphere milky, its small veins filled with pus; (6) the sinuses in the median line, those adjacent to the median line on the right side, and all the sinuses on the left side, furthermore the left internal jugular vein as far as the swelling noticed underneath the upper portion of the left sterno-mastoid muscle, filled with pus (purulent thrombo-phlebitis); (7) in the right temporal lobe an abscess the size of a walnut, and in the right cerebellar hemisphere another of the same size; (8) the remainder of the brain, especially the ventricles, normal; (9) microscopic specimens and cultivations from the cranial abscesses showed small bacilli, but prevalently staphylococcus aureus.

REMARKS.

This case is an example of an acute aural catarrh leading to death through extension into the mastoid and the cranial cavity. There never was otorrhœa, yet there was suppuration in the mastoid. No signs of otitis externa having been noticed, the pyogenic germs must have travelled from the naso-pharynx (she suffered from acute attacks of coryza)

through the E. tubes into the middle ear, and through the autrum into the mastoid process, here developing that slow form of mastoiditis which Bezold has so masterly described. This form is distinguished by a tendency to seek an outlet for its inflammatory products, along the inner table of the bone at different places, viz. (*a*) perforating it on the medial side of the tip and extending down the neck alongside the sterno-cleido-mastoid muscle; (*b*) perforating the posterior wall of the ear-canal and discharging its products through a fistula in the canal or through the tympanum; (*c*) perforating the cranial cavity, producing extradural suppuration, or cerebral and cerebellar abscesses. I have seen examples of each variety of this form of mastoiditis to which of late so much attention has been paid.

In our case the *course of the disease* was as follows.

Attacks of coryza for several months. In September after an exposure by lying on the grass and being chilled, a violent attack of otitis media catarrhalis in both ears, which improved but was not perfectly cured. Four weeks later the first symptoms of mastoiditis. Improvement again; then in two months, after an evening of gayety, the first cerebral symptoms with swelling of the mastoid extending downward. Evacuation of pus below ear brings relief for two weeks. Large opening of mastoid affords relief for four weeks, in spite of an intercurrent pleuritic effusion. Then the cranial symptoms are marked with short remissions. They are not so clear as to admit of a special diagnosis defining the nature and location of the morbid process. Death from cerebral abscess and thrombo-phlebitis.

The operation of craniotomy was done in the right way, and I would, if a case occurred, do it in the same manner again, only sooner. The uncertainty of a special diagnosis, not the surgical procedure, is the great difficulty in these cases, a fact upon which also v. Bergmann dwells in his classical monograph on the surgical treatment of brain disease (1889). Symptoms of meningitic irritation are marked in a great number of acute and subacute ear diseases, which recover by care without surgical interference. I am afraid there is at the present day too great a tendency to opening

mastoids and skulls. Precision in the determination of the indications when or when not to operate can only be obtained by a critical comparison of many fatal cases, especially when post-mortem examinations have been made. As exploratory operations, so as gynecologists now practise laparotomy, both mastotomy and craniotomy are, in my opinion, not yet harmless enough to be justifiable in many cases.

Our case was remarkable by the absence of the objective symptoms upon which commonly so much stress is laid.

1. There evidently was *suppuration in the mastoid* long before external swelling indicated it.

2. The *absence of otorrhœa* through the whole course is also remarkable and exceptional.

3. There was *sinus thrombosis* of great extent, without the common symptoms of rapid rise and fall of temperature. I measured the temperature whenever I called and the sister of the patient did it in my absence twice daily. It never rose above 101° . The sudden swelling at the left side of the neck, the side of the healthy ear, took me by surprise. It was peculiar in its shape, hard and round, about two centimetres below the tip of the mastoid, with a sharp inferior limit. Ordinarily the thrombosed jugular can be felt as a hard and painful cord along the side of the sterno-mastoid muscle. Each of the neurologists who examined the case with me thought that thrombo-phlebitis as well as meningitis could be excluded.

4. The *sinus thrombosis was most marked on the side of the healthy ear*. I can explain this only by the supposition that the formation of abscesses in the brain and cerebellum preceded the thrombo-phlebitis, and that the clotting of the right lateral sinus interrupted the circulation on the side of the diseased ear. The purulent contents of the small veins in the pia over the abscesses were emptied into the torcular and conveyed by the left lateral sinus into the left internal jugular. The abrupt swelling in the latter can be explained by plugging of the lower part of the vein with clotted blood before liquefaction of the thrombus had taken place, in the same way as the pus had been prevented from passing into the right internal jugular by the blood clots in the lateral

sinus found by the autopsy. The case shows how occult the objective symptoms and how unexpected the location of cerebral thrombo-phlebitis may be.

5. The cerebral abscesses showed, aside from the insignificant fever, only one objective symptom during the last month, that was the *double optic neuritis*. Choked disc, as far as experience has shown, is an inconstant and apparently late symptom of otitic brain disease. It does not always indicate a fatal termination of the case and disappears when the patient recovers, even in cases of pyæmia. There was no localized pain, either on percussion or spontaneously, to indicate an abscess in the case under observation.

I will conclude this paper with some remarks on the **significance of the subjective cerebral symptoms** in middle-ear inflammation.

1. *Transient headache, nausea, vomiting, and dizziness* in acute cases indicate meningitic irritation. These cases almost all recover with or without mastotomy, only a few exceptional cases of fatal termination being on record.

2. *Persistent headache, nausea, vomiting, and dizziness*, especially when the discharge from the ear diminishes, signify transition of meningitic irritation into real meningitis, and demand surgical interference:—paracentesis of the drum membrane, especially the *membrana flaccida* when bulging, or opening of the mastoid after Schwartz or Küster.

3. The *above symptoms, with delirium, stupor, impediment of speech, chills, spasms, drowsiness and coma*, signify fully developed intracranial suppuration. In the majority of such cases it may be difficult or impossible to discriminate between thrombo-phlebitis, extradural and cerebral or cerebellar abscess. The special diagnosis and localization, when strengthened by valuable objective symptoms, such as painful swelling and hardness of the internal jugular vein, (sinus thrombosis), localized pain spontaneous or on percussion of the skull (abscess), a fistula in the cranial bones (extradural suppuration), may justify, even demand, surgical interference, namely, opening the posterior cranial fossa to ligate and cleanse the lateral sinus, or opening the posterior or

middle fossa to liberate the extradural accumulation of pus, or opening the middle or posterior fossa to evacuate an encephalic abscess. Of all these varieties a certain, though small, number of cases¹ is known in which the diagnosis was correctly made and the operation successfully performed.

¹ Seventeen cases. See the bibliography in the paper by Truckenbrod in the preceding number of these ARCHIVES, p. 180.

TWO UNUSUAL CASES OF INTRACRANIAL INFLAMMATION FOLLOWING PURULENT OTITIS MEDIA WITH MASTOIDITIS.

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IN the following brief report of two cases which have come under my own observation, I desire to call the attention, not only of otologists, but also of the general practitioners, to a danger which attends suppurative inflammation of the middle ear with involvement of the mastoid, and which, though not unknown, is of such unfrequent occurrence as to be frequently forgotten.

The danger to which I refer is the involvement of the intracranial structures in an inflammatory process, from the extension of the inflammation from the external surface of the temporal bone. As is well known to every surgeon, when grave intracranial complications arise during an inflammation of the middle ear or the surrounding bony parts, the inflammation usually gains access to the cranial cavity, either through the roof of the tympanum, by rupture or by metastasis; or the lateral sinus is infected in either of the above ways by the suppurative process in the mastoid; or the channel of invasion is the internal auditory meatus, along the sheath of the auditory nerve to the meninges.

Sometimes, but with the greatest rarity, the infection takes place in the following manner. The pus formed in the middle ear or mastoid appears beneath the periosteum, giving rise to the ordinary post-auricular abscess, so familiar to every one who has seen even a few neglected cases of purulent otitis media. With the appearance of the pus

beneath the periosteum, the symptoms are apt to abate somewhat, since the tension is relieved, hence such an abscess may be neglected for a considerable period of time. During the interval, however, the purulent material burrows, dissecting up the periosteum from the bone over a large area, and thus depriving it of its nutrition to a great degree. There is practically no limit to the extent to which the bone may be thus denuded. The next step is a necrosis of this bone over a small area, and as the small sequestrum breaks down, pus is absorbed by the internal periosteum or dura, and a meningitis set up. It is not necessary even for necrosis to take place, in order to set up an inflammation of the dura. Numerous venous channels exist between the external and the internal periosteum of the cranial bones, and these, passing through the parietes of the skull, can easily carry the infection to the interior.

In young children, before the ossification of the petrosquamous suture, or rather its continuation, the suture between the mastoid and squamous portion of the temporal bone, infection is especially liable to take place, for the reason that, in many instances, this suture encloses a fold of dura mater and this increases the chances of infection, in case the external surface of the mastoid and the neighboring parts are constantly bathed in pus. It thus happens that all danger has not passed when we incise a post-auricular abscess, and evacuate the pus; it is only by a most careful exploration of the denuded bone that we can say with any degree of certainty what the termination will be. A small necrotic area may be present, through which communication with the intracranial structures may already exist, and the infectious process may have already passed beyond the limits of simple operative procedure before the abscess has been incised. Two cases which I have seen during the past two and one half years will show that this danger is not an imaginary one.

CASE I was that of a child of about ten months, who, when first seen, was suffering from a purulent otitis media of about nine months' duration. Behind the auricle was a diffuse fluctuating mass, extending fully one inch behind the posterior attachment

of the auricle, and superiorly about the same distance above the auricular attachment in this direction. The mother stated that this tumor had been present for about three weeks. The discharge from the external meatus at this time was profuse. At no time, according to the mother's statement, had the child appeared to suffer much pain. The fluctuating swelling behind the ear was opened by a free incision, and a large quantity of pus evacuated. The underlying bone was found rough and denuded in every direction, and thus the canal superiorly and posteriorly was dissected completely away from the underlying bony structures. As the operation was performed without anæsthesia, no prolonged attempt was made to find a sinus entering the structure of the mastoid, the wound was packed with iodoform gauze, and a compress and bandage applied.

The wound was dressed daily by the nurse, the child being brought to the hospital each morning for this purpose, while the mother was directed to cleanse the ear frequently during the day by means of the syringe.

Upon examining the wound a few days after the operation, a sinus was found, which admitted the probe into the mastoid, and fluids injected into this opening easily returned through the meatus; the secretion soon diminished in amount, and the child seemed to be doing very well.

In the course of a few weeks, the external wound had nearly closed, and the discharge from the ear was also growing much less in quantity; fluids injected into the sinus leading to the opening into the mastoid still returned through the meatus, showing that the drainage was efficient. The margins of the external opening, however, presented the exuberant granulations so characteristic of dead bone, and a probe introduced showed that the denuded area which existed when the abscess was first opened, had not decreased in size. As the child was doing well, however, no change was made in the treatment, and the orifice of the sinus over the mastoid at last contracted, until it would just admit the point of the syringe; the discharge from the sinus was so slight that frequently a crust would form over it under the dressing, it being necessary to separate it each time the wound was dressed, which was now every second or third day, this procedure having been entrusted to the mother, on account of the difficulty of bringing the child to the hospital during the winter months.

No further improvement taking place, I proposed to the mother the advisability of reopening the wound under anæsthesia, and removing the carious bone with the curette; this she finally acceded to, and nearly a week later chloroform was administered and an incision made over the affected region, following the course of the old incision and extending upward, and somewhat backward, about two thirds of an inch above the superior margin of the bony canal. On separating the edges of this incision, and exploring the deeper parts with the probe, this instrument was found to enter an opening at the upper part of the incision, and to pass without encountering the least resistance, for a distance of two and one half inches directly inward; the hemorrhage from the wound was very free, the blood being decidedly venous in character. Recognizing at once that the wound opened into the cranial cavity at the line of the squamo-mastoid suture, and further, as the meninges had not been encountered, that infection and subsequent meningeal disintegration had taken place at this point, the wound was packed and the child permitted to come out from under the influence of the anæsthetic. The serious nature of the discovery was imparted to the parents, and close questioning elicited the fact that a few days previously, and during the interval in which I had not seen the child, the tumefaction behind and above the ear had re-appeared, and that the child had been drowsy, or, when awake, irritable. On the day preceding the operation, the mother had removed the dressing, and the crust covering the sinus, and immediately a large amount of pus was discharged, and the child appeared relieved and hence did not attract my special attention immediately before the operation.

On the following morning, the wound was dressed, and the child appeared natural, but the next day marked cerebral symptoms, indicative of meningeal inflammation, appeared, and the case terminated fatally at the end of a few days. No autopsy was permitted.

In this case there seems to be no doubt that although the mastoid cortex had been perforated, and satisfactory communication with the middle ear established, yet during the time the post-auricular abscess remained unopened, the periosteum had been stripped from the bone over a large area, which subsequently failed to regenerate; in this way

perforation at the sutural line took place, and as the external opening over the mastoid gradually closed, infection occurred through the sutural perforation from the purulent material within the abscess cavity, leading to meningeal inflammation and disintegration at this point.

The history carries with it the suggestion that, in young children especially, a thorough examination of the entire denuded area should be made upon opening any abscess connected with the mastoid, and the sutural lines examined in case the bone is denuded in these situations, and also that although an inflammation within the mastoid may have terminated in spontaneous perforation of the cortex, the pus in this location is still a potent factor for evil.

Schwarze¹ cites a case of abscess of the temporal lobe in a child, the result of a suppurative process in the middle ear, the infection having taken place through the petro-squamous suture; such cases are not as rare as those in which the infection takes place, as in my case, through the continuation of the suture which marks the junction of the squamous and mastoid portions of the temporal bone.

It would seem that, while the sutural junctions in young children might be somewhat easy points of invasion for purulent material, the compact mass of the adult temporal bone would naturally furnish a barrier to such an inroad. This we find is not the case, as the following history will show:

CASE 2.—J. C., æt. forty, was admitted to the hospital with a history of a purulent discharge from the right ear of four weeks' duration. The pain had been severe until the discharge appeared, after which time it had caused him very little trouble. Patient had been treated for syphilis, and there was evidence of a former iritis in the left eye. Examination revealed a great amount of swelling and œdema of the tissues above and behind the right auricle; the œdema extended forward, involving the right eyelid, almost closing the eye. The external auditory canal was greatly swollen, especially along the postero-superior aspect and in its deeper parts. The membrana tympani exhibited a perforation of small size in the postero-superior quadrant, through which pus could be seen to exude slowly.

¹ *Archiv für Ohrenheilk.*, vol. xxxii., p. 295.

Pressure over the œdematous region above and behind the auricle, elicited a moderate amount of tenderness ; the patient also complained of a dull pain over the entire right side of the head.

OPERATION : After a thorough cleansing of the parts, an incision was made from the tip of the mastoid to a point three fourths of an inch above the level of the superior wall of the canal, close to the attachment of the auricle. The tissues were greatly thickened and the bone was found denuded throughout the entire extent of the incision, and over a considerable area beyond the limits of the incision, in all directions. The chisel was applied and an attempt was made to open the antrum. The entire mastoid was found to be sclerotic, and after chiselling over a broad area for a considerable depth, the posterior wall of the canal was broken down and communication with the middle ear established in this way. The wound was dressed in the usual manner and the patient returned to the ward.

The history of the case was uneventful for eight days, except for the persistence of the œdema of the right eyelids, as well as of a certain amount of thickening and infiltration in front of the tragus. On the eighth day the patient complained of headache, and the temperature, previously normal, rose to 100.5° in the evening ; the appearance of the wound was unchanged, and the following morning the temperature was normal and the unpleasant symptoms had disappeared. The night, however, was an uncomfortable one, the patient complaining of intense headache upon the right side. This persisted throughout the following day, and was not attended with any rise of temperature ; the mental condition was perhaps a little dull, but at the time I attributed this more to the general temperament of the patient than to any other cause. Upon visiting him in the afternoon, an inspection of the wound revealed an increase in tension of the parts lying in front of the tragus, together with a more marked œdema in the right anterior temporal region. Believing that there was deep-seated suppuration beneath these swollen tissues, I anesthetized the patient and prolonged the former incision forward and downward, liberating about two drachms of pus from beneath the periosteum. The bone over the area was very rough, and so much degenerated that in tilting the flap downward it easily crumbled under the elevator. The removal of these fragments revealed the meninges bulging into the wound. The dura was deeply congested and granular ; pulsation could be felt. Exploratory puncture with a hypodermic needle yielded only a bloody fluid.

After removing all softened bone, thus enlarging the opening considerably, the wound was packed and the patient returned to bed.

On the following day, there was considerable headache and the condition of habitude was well marked. The wound was dressed, and was found to be doing well; the intradural pressure appeared less marked than at the time of the operation. During the night there was mild delirium; in the morning the patient at first seemed a little brighter than upon the preceding day, but he soon passed into a condition of stupor, from which he could only be aroused with difficulty; in the afternoon the breathing became stertorous, and assumed the Cheyne-Stokes type, and a well marked paresis of the right upper and lower extremities was developed. Dr. Abbe kindly saw the case with me, and concurred in the opinion as to the advisability of exploring the cranial cavity. The patient was anæsthetized and, assisted by Drs. Abbe and Bacon, and by Drs. Esson and Ard of the house staff, I enlarged the opening into the cranial cavity in all directions by means of the rongeur. A dural flap was then raised, and an aspirating needle was passed into the cerebral substance in several directions, without revealing any collection of fluid. A director was passed beneath the meninges, inward along the petrous portion of the temporal bone, and forward toward the frontal region, without evacuating any fluid. The lateral sinus was exposed and found to be healthy. No further exploration appearing advisable, the dural incision was closed with catgut sutures, the external wound dressed with iodoform and bichloride gauze, and the patient returned to bed. The coma remained unchanged after the operation, and death ensued eighteen hours later. The temperature, except for the rise already noted, had been normal throughout.

The POST-MORTEM EXAMINATION by Dr. Weeks revealed a hemorrhagic pachymeningitis extending over the entire right side, but most marked over the frontal and temporo-sphenoidal regions. The effusion had in a marked degree flattened the convolutions, especially in the frontal region. In addition to the hemorrhagic lesion, a small amount of purulent exudation was found upon the internal surface of the dura, possibly due to the breaking down of the fibrin of the clot. The brain itself was normal. The roof of the tympanum exhibited nothing abnormal, and the meninges in this region were healthy.

In this case then, the pus resulting from the inflammatory process in the middle ear, not being able to find an exit through the mastoid cells, owing to the osteo-sclerosis which existed in this region, dissected up the periosteum of the external auditory meatus, and entering the temporal fossa burrowed beneath the periosteum, denuding the squamous and mastoid portions of the temporal bone over a large area, causing a circumscribed necrosis of the squamous portion of the temporal bone. At this point an inflammation of the dura was set up, and this inflammation, instead of following the ordinary course of an infective pachymeningitis, took on the hemorrhagic form of inflammation, characterized, as we know, by the formation of a large number of thin-walled blood-vessels, the subsequent rupture of a number of these vessels giving rise to the submeningeal effusion, which terminated the life of the patient. Had the subdural effusion been evacuated by the surgical procedures instituted, the life of the patient might have been prolonged, although from the nature of the affection the ultimate result must almost necessarily have been fatal.

These two cases furnish us with sufficient evidence that a subperiosteal abscess of the mastoid region may in itself constitute a somewhat grave condition, and that even when a free channel is established from the middle ear to the outer surface of the mastoid, the danger of purulent infection of the cranial contents has not passed. I am aware that this mode of infection is not a discovery. Attention was first called to it by Andeer,¹ who reported a case of meningitis following a caries of the external surface of the temporal bone, consecutive to a subperiosteal mastoid abscess in a child of one and a half years. The child had suffered from a purulent otitis media previously. Somewhat similar cases have been reported by Pomeroy,² and Reinhard and Ludewig,³ as occurring in children, while Moore⁴ observed an

¹ *Arch. für Ohrenheilk.*, 1874, vol. ix., p. 139.

² Internat. Otol. Congress, 1876, *Arch. für Ohrenheilk.*, vol. xii., p. 313.

³ *Arch. für Ohrenheilk.*, vol. xxvii., p. 218.

⁴ ARCH. OF OTOLGY, vol. xi., p. 25; translation in *Zeitsch. für Ohrenheilk.*, vol. xi., p. 254.

instance occurring in a male of fifty years. Andeer in his paper calls special attention to the infection of the cranial contents from a subperiosteal abscess, a point which is not especially emphasized by the other writers. In none of the cases reported, however, has the metastatic meningeal inflammation been of the hemorrhagic type, and I am of the opinion that this is an exceedingly rare occurrence.

In closing, I desire to thank Dr. Ard of the house staff of the New York Eye and Ear Infirmary for the careful notes of Case 2 which he has so kindly furnished.

A CASE OF DESTRUCTION AND PARTIAL OSSIFICATION OF BOTH LABYRINTHS, PROBABLY IN CONSEQUENCE OF MENINGITIS.

BY PROF. H. STEINBRÜGGE, GIESSEN.

Translated by Dr. WARD A. HOLDEN, New York.

(*With Figs. 1 and 2, Plate III.*)

On the 23d of May, 1889, a ten-year-old boy, F. E., was brought to the Giessen clinic in a comatose condition, and died the following day. Examination of the almost unconscious patient showed widely dilated pupils, increased cutaneous reflexes, general pallor of the skin, with no appreciable changes in the thoracic or abdominal organs. Now and then there were deep inspirations or loud groans. The temperature was 37.2° . The persons accompanying the patient gave a meagre history, which was completed by later inquiries.

The autopsy showed hydrocephalus internus of high degree, no macroscopic changes in the meninges or brain substance; bronchitis, calcification of the bronchial glands, slight swelling of the mesenteric glands, hypertrophy of both tonsils. As was learned later, the boy had been seized, fourteen weeks before his death, with an attack of headache, vomiting, and convulsions, and had been unconscious for several hours. He had a high fever, his neck was stiff, and his head bent backward. Three days later it was noticed that he did not hear. The patient did not recover from his illness, although at times he was able to leave his bed. The fever and the headache continued to recur.

The macroscopic examination of the ears showed the following: The right membrana tympani has a fairly large round perforation in its anterior half; the mucous membrane

of the tympanic cavity appears thick and grayish-white. The mastoid process is sclerosed and contains few air cells.

The mucous membrane of the left membrana tympani is thickened and discolored; there is a small cicatrix in the anterior superior quadrant. The mucous membrane covering the long process of the incus is adherent to the posterior wall of the tympanic cavity. The mucous membrane of the wall of the labyrinth and of the mastoid antrum is thickened and its vessels injected; there is some mucous exudation at the bottom of the tympanic cavity. Air cells are more numerous in the mastoid process than on the right side.

The microscopic examination of the labyrinth revealed the well-known consequences of intense inflammation, in the destruction of the normal soft parts, the new-formation of very vascular connective tissue, and partial ossification of the latter. In the left cochlea the lower turn was more plugged with connective tissue and new-formed bone than the upper turns, corresponding in this regard to former observations. Only the crista spiralis and the ligamentum spirale, the latter partly ossified, could be recognized in their outlines. The new-formation of connective tissue extended into the aqueductus cochleæ. Many vessels were seen in the tissue that filled the lower turn; and there were a number of extravasations of blood due to rupture of their walls. In some of the preparations, the components of the upper turns of the ductus cochlearis were destroyed except for a small group of cells, and in the middle turn there were only a few cells in the location of Corti's organ. The ligamentum spirale was partly separated from the scalæ, and isolated tracts of connective tissue passed through the upper scala; Reissner's and Corti's membranes were wanting here. The membrane of the fenestra rotunda was thickened on both sides by new connective tissue. The mucous membrane of the promontory was moderately swollen, and infiltrated with cells.

The nerve fibres of the acoustic in the internal auditory canal were preserved here and there, but for the most

part degenerated and replaced by connective tissue, which did not stain with chromic acid like medullary substance. In this case also the fibres of the facial nerve had withstood the effects of the inflammatory changes.

At the entrance of the central canal of the modiolus the acoustic nerve fibres were almost entirely destroyed. The ganglion cells of Rosenthal's canal appeared shrunken; beyond this no nerve fibres passed into the laminae spirales.

The vestibule, the ampullæ, and the semicircular canals were filled partly with connective tissue, partly with bony substance; there being scarcely a trace of the normal structures. The ossification was farthest advanced in the semicircular canals, which were so filled with the bony mass that they could with difficulty be recognized (Fig. 1).

The quantity of blood-vessels within the new-formation is remarkable, as in number and size they far surpass those of the surrounding bone. Sections of the twigs of the vestibular nerve show preservation of a portion of the fibres, but their number is small.

The right labyrinth showed in general the same changes as the left, but the upper turns of the cochlea contained more connective tissue than the left. In the right inner semicircular canal small splinters of bone were seen within the thickened dural sheath, not adherent to the bone and corresponding in size to cavities in the bony wall, apparently the result of severe inflammation in the region of the periosteal covering, with disseminated necrosis of the tissues.

The consecutive ossification of the periosteum detached from the wall of a semicircular canal as shown in Fig. 2, is also remarkable. The detachment took place no doubt at the beginning of the inflammatory process, and remained limited to a portion of the periphery of the bony canal. The membranous semicircular canal is destroyed, and the greater portion of the bony canal is filled with connective tissue and thin-walled vessels, which latter show groups of blood corpuscles outside their walls. The ossification began here apparently in the adherent periosteum, and some little distance into the detached folded layer of periosteum (Fig. 2, *a*).

Besides this there was a detachment of the base of the stapes in consequence of the purulent destruction of the annular ligament. In vertical sections through the right vestibule, the base of the stapes was disconnected with the fenestra ovalis, and displaced to the tympanal side: in place of the annular ligament groups of blood and pus corpuscles were seen both at the upper and lower ends of the base of the stapes, but the infiltrated mucous membrane covering the tympanal side was preserved and had probably hindered the complete luxation of the stapes.

Since there was a perforation in the right membrana tympani and purulent exudation at the bottom of the tympanic cavity, and as the history showed that the ear had discharged previously, it might appear doubtful whether the detachment of the stapes had occurred from without inward, or in the contrary direction. According to the first hypothesis the inflammation of the right labyrinth must be considered secondary; the infecting material passed then from the right labyrinth into the cranial cavity, causing there a meningitis, in consequence of which the inflammation was transmitted to the left labyrinth.

On the other hand there is the possibility that there had been a sporadic infection with the poison of cerebro-spinal meningitis, in a patient already suffering with the effects of a purulent otitis media,—that the two processes had developed independently. Accepting the latter supposition, the destruction of the right annular ligament must have occurred from within outward. The latter hypothesis would seem the more probable, since a breaking through from the tympanic side is rare in the ordinary chronic purulent affections of the middle ear, but occurs mostly in connection with caries in the labyrinth wall, which was here excluded. The preservation of the tympanic mucous membrane covering the articulation of the stapes and the fenestra ovalis also argue against this idea. It is further known that cerebro-spinal meningitis, without leaving marked changes in the meninges, sometimes causes a chronic hydrocephalic condition; while the purulent carious processes within the petrous portion of the temporal bone more frequently lead

to subdural abscesses, purulent meningitis, cerebral abscesses, or sinus thrombosis.

It is also of interest to see that with a duration of only fourteen weeks there should have been so complete a filling of portions of the semicircular canals with bony masses, as Fig. 1 shows. Without a microscope it was scarcely possible to follow the course of the semicircular canals on either side, and this observation shows how careful we must be in judging of the ears of deaf-mutes whose previous history is unknown. The reports of the absence of single semicircular canals or of other parts of the labyrinth, which the earlier anatomists regarded for the most part as congenital malformations, may in many cases be explained as being due to inflammatory changes occurring in youth.

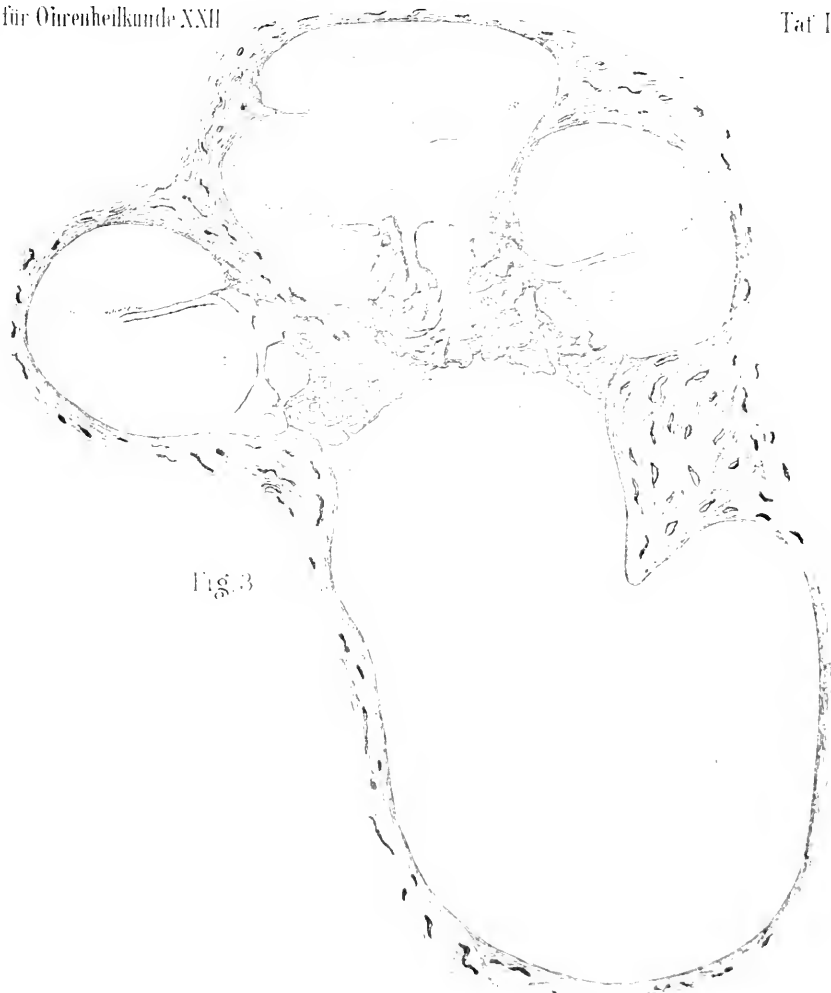


Fig. 3

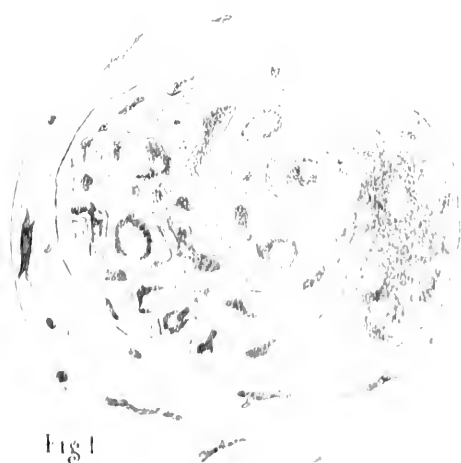


Fig. 1



Fig. 2

A CASE SHOWING EXTENSIVE DESTRUCTION OF THE NERVE IN ALL THE TURNS OF THE COCHLEA.

BY PROF. FR. BEZOLD AND DR. A. SCHEIBE.¹

Translated by Dr. WARD A. HOLDEN, New York.

(*With Fig. 3, Plate III.*)

THE changes to be described here were found in the left ear of a very deaf physician who died at the age of sixty-one. The clinical history was as follows.

A marked deafness in either ear was noticed twenty-three years before his death, and had gradually increased. In his last years, conversation was heard at a few inches with the right ear, but not at all with the left. In the early years of his deafness he had a number of attacks of giddiness without nausea. There were rarely subjective noises. No hereditary element could be discovered.

Six years before the deafness was noticed the patient had a severe basilar meningitis and at about the same time began to take morphine in gradually increasing doses. His life was passed in continued mental activity.

In the last ten years his bones were fractured several times by slight violence, but healed rapidly. At the autopsy the bones of the extremities were found to be very brittle (osteopsathyrosis), and the vertebræ and the spongy part of the petrous portion of the temporal bone were so soft (osteomalacia) that parts of the latter could be cut without being decalcified.

The left ear only was examined.

¹(From the Pathological Institute in Munich). This case was reported briefly and the preparations demonstrated at the sixty-fourth meeting of German naturalists and physicians in Halle, by Dr. Scheibe.

The membrana tympani seen from without was on the whole normal in color and curvature, the reflex was visible, there was a slight injection along the handle of the malleus, at the umbo an opaque spot and a diffuse opacity of the peripheric zone below.

The mucous membrane of the naso-pharyngeal space and of the ostium pharyngeum tubæ, apart from some dilated veins in the roof of the pharynx, was not particularly changed.

In order to test the conducting apparatus, a manometer tube filled with a colored fluid was cemented into the upper semicircular canal in the manner which Bezold has described.¹

Under the pressure of the finger upon the aqueductus cochleæ, as well as upon the porus acusticus internus filled by the two nerves, the fluid in the manometer tube ascended several millimetres and remained at this height. Under pressure upon the aqueductus vestibuli, it rose one millimetre and sank back to its former height.

The transverse sinus and probably also the intradural endolymphatic sac of the aqueductus vestibuli had been opened in the preparation of the specimen.

Variations in ærial pressure in the external canal, the tympanum being unopened, had the following effect. When the rubber tube placed in the canal was blown into and when the letter "P" was sounded directly before the opening of the tube, there was a shade of motion in the labyrinth manometer, the maximum effect with increased pressure being 0.6 mm, and with diminished pressure 1 mm (0.6 and 1.2)²

Increased pressure in the tube caused a rise of 5.5 mm, and decreased pressure a fall of 4 mm (3.7 and 4 mm) in the labyrinth manometer.

When the tegmen tympani was removed, the bone here was found to be fairly thick and composed of spongy vascular substance which was so soft that for the most part it could be removed with the chisel without the aid of the

¹ *Arch. f. Ohrenheilk.*, vol. xvi., "Experimental Studies on the Conducting Apparatus of the Human Ear."

² The figures in parentheses indicate the average values found by Bezold in forty temporal bones manometrically examined. Cf. *Arch. f. Ohrenheilk.*, vol. xvi.

hammer. The ligamentum mallei superius was also removed.

The mucous membrane of the tympanic cavity appeared pale, lustrous, moist, and free from injection. There were no synechiæ, excepting the delicate transparent mucous folds stretching from the short process of the incus to the outer wall, which are usually present. The mucous membrane of the tubes was also of normal appearance.

When the motility of the conducting chain was tested again with the tympanic cavity opened, the maximum with increased pressure was only a trace, the maximum motion in the labyrinth manometer with decreased pressure only 0.13 *mm* (0.33 and 0.94 *mm*). From this it is evident that the excursions of the labyrinthine fluid with closed tympanic cavity were due almost entirely to the membrane of the fenestra rotunda, which had shown that it had its normal motility.

A glass rod 10 *cm* long, cemented to the head of the malleus as an indicator, showed with increased and diminished pressure in the canal a maximum excursion and incur-sion of 5 and 13 *mm* (5.9 and 13.4 *mm*). Cemented in the same manner upon the incus, the indicator showed a maximum of motility of 2.5 and 4 (1.9 and 4.1 *mm*).

As manometric examination showed no diminished motility, the only conclusion was that the markedly diminished motility of the entire chain was due to a partial fixation of the stapes or of its annular ligament. The stapes showed a slight movement when its head was touched with a probe.

Another case which Bezold¹ examined, showing calcification of the ligamentum annulare stapedis without other changes in the ear, demonstrated that even when manometric motility of the stapes was wanting, a whisper might be heard at a distance of 6 *cm*, as was found in life.

As the decreased motility of the stapes was not sufficient to explain the deafness in our case, the petrous portion of the temporal bone was hardened, decalcified, imbedded, and

¹ "On the Relation of Bone- and Air-Conduction in Rinne's experiment,"—*Aerztl. Intelligenzblatt*, No. 24, 1885.

cut in a series of sections in a direction perpendicular to the long axis of the pyramids.

The membrane of the fenestra rotunda was normal, as was also the plate of the stapes and the ligamentum annulare, which shows that there may be a diminution of motility at this point without marked changes being found in the decalcified specimen. The remainder of the middle ear so far as examined was normal.

The examination of the labyrinth showed as the principal change a marked deficiency in the number of nerve fibres, in equal degree in all three turns of the cochlea.

The sections showed in the depth of the meatus auditorius an ampulla-formed cavity in the position of the ramus cochlearis. With the microscope it was seen that only very thin bundles of nerve fibres entered the tractus foraminulentus and the central canal, and from there passed to the ganglion spirale. The small portion of the ramus cochlearis that is preserved, shows normal fibres. In the entire course of the ganglion spirale, the greater part of the ganglion cells are destroyed. In their place in the half of Rosenthal's canal toward the modiolus are empty spaces, while in its outer part the ganglion cells are apparently unchanged. Beyond the ganglion spirale, between the two sheets of the osseus lamina spiralis, are a few isolated nerve fibres, and between them a communicating system of cavities extending through all the turns of the cochlea.

Corti's organ is represented in the vestibular portion of the cochlea only by disconnected groups of cells. In the first turn these cells form a small elevation in which none of the normal elements can be recognized. In the greater portion of the second turn, the form of Corti's organ has been preserved. At the apex of the cochlea there is no trace of Corti's organ nor of the cellular covering of the lamina spiralis membranacea.

The remaining parts of the ductus cochlearis also show changes. In the vestibular portion of the first turn, Corti's membrane is partially adherent to Reissner's membrane, and the latter to the stria vascularis. Corti's membrane is here very short and narrow and is wholly wanting in a por-

tion of the first turn. In the second turn it is normal. Reissner's membrane is only present in the vestibular portion of the cochlea.

The most marked changes are found in the third turn. Here the bony portion is wanting in part. The second turn communicates with the third through a perforation in the bony wall. The perforation reaches internally to the modiolus, externally there is a small rim of bone remaining. The periosteum passes in part from the upper surface of the latter uninterruptedly over the free margin to the lower surface (see Fig.), and in part continues forward in new-formed connective-tissue membranes, which on the one hand extend to the remainder of the lamina spiralis in the third turn, and on the other hand pass to the modiolus, thus forming a membranous septum, not shown in the figure.

The modiolus and the hamulus are also almost altogether wanting in the third turn, but the crista spiralis is fairly well preserved in the upper turn. It appears normal in the other turns, but does not take the stain and no cell nuclei are to be seen (Fig., *b*). The membrana basilaris, the upper half of the ligamentum spirale and the neighboring periosteum are also seen to contain no cells. The stria vascularis and the prominentia spiralis, elsewhere normal, are here represented by a layer of flat epithelium.

Reissner's membrane is also wanting here, and a detached portion of Corti's membrane adheres to the crista spiralis.

The bone of the cochlear capsule, where it is covered by the ligamentum spirale, shows in the third turn a shallow irregular defect (Fig., *c*). In the last portion of the apex turn all the structures of the ductus cochlearis, together with the crista spiralis, are wanting. Attached to the remainder of the hamulus is the new-formed membrane spoken of above.

The vestibule and the semicircular canals, unlike the cochlea, are almost normal. The nerve twig for the ampulla of the upper semicircular canal is partially atrophic. The crista of this ampulla is not well enough shown in the sections to judge of its condition.

CRITICAL REMARKS.

In this labyrinth there was a more marked and extensive atrophy of the ramus cochlearis than has been found, except in the case of a deaf-mute reported by Scheibe¹

The pathogenesis is doubtful. The destructive changes and the development of new tissue, principally in the upper turn, might be referred to the basilar meningitis occurring twenty-nine years previously, but against this argues the fact that the changes were most marked in the third turn and not in the first as was found in all the cases hitherto reported, and further by the fact that the deafness had been noticed for six years only.

The bony defect in the upper portion of the cochlea might be a symptom of the general skeleton affection. But when we remember that the most extensive pathological changes, and particularly the formation of new membranes, took place at this point, it seems more probable that the resorption of the bony cochlea was due to a previous inflammatory process.

Whether the atrophy of the nerve was due to an inflammation of the cochlea, or whether the morphine habit was the cause or whether finally there were senile changes present, cannot be definitely decided until a greater number of histological examinations of the labyrinth shall have given us a wider knowledge of the subject.

Explanation of the Figure.

Section perpendicular to the long axis of the pyramid.

Absence of the nerve fibres and of a greater portion of the ganglion-cells in all three turns.

a. Ampulla-formed cavities in the substance of the cochlear nerves.

b. Crista spiralis with no cells.

c. Superficial defect in the bone; at *d* and *e* defect in the wall between the second and third turns.

f. Ganglion spirale.

¹A case of deaf-mutism with atrophy of the acoustic nerve, etc. This volume, p. 12.

EXCISION OF THE MEMBRANE AND OSSICLES IN SUPPURATIVE DISEASES OF THE ATTIC.¹

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THE object of this paper is the presentation of several cases of operative interference in suppurative disease of the attic, and by their success, aid slightly in the further extension of this operation. Supposing that all are familiar with the history of this operation, so much having been written upon this subject of late, I will not burden you with an extensive *résumé* of the literature. The attic, for the relief of which most of my operations were performed, is separated above from the general tympanic cavity by the short process of the malleus; its external boundary is formed by the outer wall of the tympanic cavity and Shrapnell's membrane; internally it is bounded by the head and neck of the malleus and the anvil; and above by the superior ligament of the malleus. According to Schmiegelow this space is divided into an anterior and a posterior portion, designated *cellulæ Shrapnelli* and *antrum Shrapnelli*, thus maintaining an analogy between this space and the mastoid, with its antrum and cells. It is largely due to the cellular structure of the *cellulæ Shrapnelli*, giving rise to retention of secretion, that inflammations in this region are attended with such unpleasant results.

ÆTIOLOGY. The want of frequent observation of acute inflammation of the attic, has given rise to some speculation as to the probable cause of localized inflammation in this cavity. Some authorities state that acute inflammation

¹ Read before the D. C. Medical Society, March 16, 1892.

in this region is rare; they evidently refer to absence of the observation of this condition, rather than to its actual occurrence, as all cases must have been acute in some stage of their history. Wolb and his exponents state the involvement of the attic is the active resultant of a furuncular or other inflammatory change within the external auditory canal, extending into this space through a supposed patulus foramen Rivini. Schmiegelow and others claim, with just reason, that the process must be of a tubal origin. As Schmiegelow states: "Why should it be necessary to assume a different manner of development for inflammation in Shrapnell's membrane, than for that in the other forms of middle-ear inflammation. Do we not find that middle-ear inflammations, of whose tubal origin there can be no question, often limit themselves to particular portions of the middle ear?" Two cases which developed under my eyes bear out the tubal origin, or rather negating an external causative agency of this condition, are worthy of notice. About a year ago I had under my observation a young lady who had quite a severe acute inflammation of the middle-ear cavity which underwent resolution. Shortly after subsidence of all inflammation within the antrum, and the almost complete restoration of hearing, there was, without any apparent cause, the sudden development of acute pain over the mastoid region, and some mild febrile disturbance. Examination of the ear, which had not now for a week been subjected to inspection, revealed the membrane proper, in nearly a normal condition, but just above the short process there was observed a small granule which was evidently, and proved to be, a small polypus protruding through Shrapnell's membrane. Previous to this there had been no suppuration. With removal of the granulation, an exit was given to the purulent discharge. The external auditory canal was in an absolutely normal condition. The patient contracted a severe cold ten days before this occurrence and this evidently rekindled the attic inflammation which had remained dormant since the primary involvement of the whole cavity. The second case of evident tubal origin, the external canal being normal, developed in one of my

operative cases. When this patient came under my observation there was an attic inflammation in the right ear and a retracted membrane on the left side, but no suppuration. For three weeks previous to operation, the left ear was catheterized every alternate day. Ten days after the operation, the patient called my attention to the fact that, since his last visit, he had become very deaf in his left ear. Upon inspection, I was surprised to find the canal partly filled with cheesy pus, the removal of which revealed the existence of a polypoid growth protruding through Shrapnell's membrane. It is evident that the exposure incident to the operative interference produced a tubal catarrh, which gave rise to the implication of the attic. There was no pain; no involvement of the atrium. Patient states that this ear had never suppurated before. These two cases are worthy of note on account of the sole solution of continuity being in Shrapnell's membrane, and their development without any marked subjective symptoms, while the remainder of the membrana tympani was normal excepting the slight injection at the upper portion of the membrane.

Suppurative inflammation in the attic is one of the most obstinate forms of middle-ear affections which the specialist meets. The persistence of the suppuration is largely due to the want of sufficient drainage, and the injurious results brought about by the carious or necrotic involvement of the malleus, incus, and the outer wall of the tympanic cavity. Should there be caries or necrosis of any of the ossicles it is impossible to bring about a restoration of the parts without the exfoliation of the parts involved, or their removal by artificial means. No amount of cleansing, even by the use of intra-tympanic syringes, or instillation of astringents, however well and thoroughly carried out, will bring about the desired result should there be destructive changes in or about the ossicles. In no other region of the body has the general surgical principle, viz., the removal of the offending and diseased part and the establishing of free outlets for pent-up secretion,—been so thoroughly disregarded as in the treatment of these suppurative changes within the middle ear. The dangers arising from prolonged suppuration in

this vicinity cannot be too forcibly insisted upon when we consider the close proximity and minute separation from the cranial cavity, the probable involvement of the mastoid, with its manifold complications, the possibility of septic infection, and the danger of erosion of the carotid artery.

The symptoms giving evidence of this condition are the persistence of an offensive purulent discharge from the ear; the presence of a perforation just above the processus brevis, with more or less loss of hearing; the membrana vibrans may or may not be involved. The presence of necrosis, if existing, can readily be made out by the use of the probe.

The inconvenience and danger to which the patient subjects himself in resorting to this operation, which must always be considered, are of the most insignificant nature. There is no danger in the operation itself, when skilfully done; but there is in this as in all surgical operations of its class, the danger to which one exposes one's self in passing into the unconscious state through the administration of an anæsthetic. There is no pain. My patients have never had administered to them a narcotic, nor have they ever requested the administration of such an agent. They suffer no inconvenience, and on the second day are allowed to move about the house. I do not find it necessary to keep them in bed. There is no febrile disturbance.

THE OPERATION. As hemorrhage is a very annoying factor in this operation, and as a succulent and congested membrana tensa is usually the provider of this blood, I usually prefer to put my patients through a short course of preliminary treatment before subjecting them to operative interference. During the prolonged suppuration, the purulent discharge has been gravitating down and over the surface of the membrane, thus irritating it and giving rise to a chronic myringitis, as often evidenced by the succulent and hemorrhagic condition of the membrane. In these cases I usually resort to a daily thorough cleansing of the cavity and the after use of astringent applications, until the membrana tensa shows less evidence of congestion. On the day of the operation, the patient is prepared, as is usual in

operative cases, and, in addition, immediately before the operation, the ear is well cleansed with a mild antiseptic solution. As the patient must be absolutely still, it becomes necessary to resort to general anæsthesia. Good light is also an indispensable adjunct to the success of the undertaking. I prefer ether, which is *inflammable*; being an adherent to that opinion shared by the mass of practitioners, that administration of chloroform is absolutely unjustifiable. The use of ether deprives us of all forms of light producing a flame. We must, therefore resort to the use of either reflected sunlight or electricity. We can place little dependence upon sunlight. In order to make use of the sun, we must only operate upon an absolutely cloudless day; small clouds occasionally obscuring the light prove very annoying and embarrassing to the operator. The frequent waiting and delays from day to day, in order to obtain the necessary light, proves distressing to the nerves of the patient, however much of a stoic he may be. Sunlight when obtained is cheap and all-sufficient. I have operated with no other light. In this vicinity a day or two of storm is frequently followed by one or more of cloudless heavens. I usually resort to the expedient of allowing two bad days to pass, and then appoint the third for my operation, and so far have been blessed with five successes and one failure. A broad, high window with good southern exposure is essential. The electric light is the light par excellence and the Sexton lamp, made by the River and Rail Company, is the best means of using it. The electric light requires the use of a small portable storage battery and the necessary charging cells. This light requires no postponements, but is expensive. Where one has many of these operations to do it would be far preferable to use the electric light.

The *modus operandi* of this delicate surgical procedure varies according to the exigencies of the case. In this operation, as performed by Sexton and Burnett, the incision is carried from the perforation, with a flat probe-point knife around the circumference of the membrane, thus severing the membrane from its attachment to the tympanic ring. The posterior flap is then thrown forward, and the now

exposed incudo-stapedial articulation is separated by the narrow rectangular knife. The incus is now grasped by forceps, and gently but firmly drawn down and outwards, and removed from the tympanic cavity. The third step is accomplished by passing the trowel-shaped knife below the short process of the malleus and dividing the tensor tendon and ligamentous bands holding it in position, and it in turn is grasped above the short process, and extracted with the remnants of the membrane. Noting in my first cases, that a complete regeneration of the membrane always followed, caused me to pursue a different method in my subsequent operative procedure. In these latter cases I transfixed the membrane just below the short process, with the trowel-shaped knife, dividing the tendon of the tensor tympani and other ligamentous attachments of the ossicles in the attic. In withdrawing the knife, I divided the membrane along the posterior border of the manubrium. A similar incision is made along the anterior border of the manubrium from the perforation to the umbo. The malleus is now removed. The incus is then examined, and, if found to be diseased, the posterior flap is thrown back against the posterior wall of the canal which exposes the incudo-stapedial joint which is divided and the incus extracted. The posterior flap is drawn forward, and the operation is complete. By these means, less injury is done to the membrane and a quicker resolution is sure to follow. The canal should now be cleared of blood by gentle syringing with warm antiseptic solution, and the canal closed with a wad of absorbent cotton impregnated with iodoform.

The advantages in favor of this operation are legion, the ill-effects none. It belongs to that class of cases in which we might well say that if we do no good, we do no harm. Even if the discharge does not cease within a few weeks, we have gained much by the interference. The offending cause of the continuous suppuration is removed, the character of the discharge is changed and its quantity lessened, vertigo ceases, hearing occasionally improves, tinnitus disappears, all possible danger of involving contiguous cavities is avoided, and the seat of the disease is more accessible. Hemorrhage

is a very annoying feature in this operation. It only requires a few drops of blood to obscure the fundus of the ear and interfere with further procedure. The blood must be mopped up with absorbent cotton, or syringed out with very warm water. Sometimes the blood flows quite profusely, the canal filling up quite as rapidly as it is removed by mopping or syringing. These cases prove very vexatious and require great patience. After the hemorrhage has been checked, I find it wise to instil a few drops of a ten per cent. solution of cocaine before proceeding. Hemorrhage has never given me any inconvenience after the instillation. I would only advocate the use of cocaine where the hemorrhage was annoying, because I imagine that the marked shock following the operation in the cases in which I used it was more the effect of the constitutional action of the cocaine than anything else. It is hardly necessary for me to state that this operation is difficult, requires skill and manipulative dexterity and a thorough anatomical knowledge of the relations of the parts affected.

CASE 1.—A young man, twenty years of age. Suppurative disease of both attics since early childhood. No knowledge of cause, but supposes it to be habit he had while a child of filling the ear with bits of paper. Profuse, offensive discharge, tinnitus, and frequent earache. Conversational voice heard at five feet. Subjected to much treatment. Right ear healed by careful cleansing and topical applications. Left ear showed necrosis of malleus and I excised the bone. Two weeks after excision, suppuration ceased and patient still continues in good condition. Subjective symptoms all improved. Hearing at eleven feet. This patient took ether badly. Three weeks after operation reported, stating that he had suffered from severe headache for several days and noticed that lower extremities were swollen. On questioning, found that he had voided scarcely any urine for forty-eight hours. Under Dr. Bayne's care he rapidly recovered from the attack of acute nephritis. Had never had symptoms of Bright's disease before. Was it due to the ether?

CASE 2.—A girl, sixteen years of age. Suppuration of an offensive character, quite profuse, from an attic perforation of many years' standing. Cause not known. Membrane retracted. Hear-

ing of voice three inches. Excision of malleus and incus. Suppuration ceased in two months. No improvement of hearing.

CASE. 3.—A young man. Medical student. Suppurative disease of right attic. Discharge profuse and offensive. Said to be the result of an acute inflammation of five years ago, since which time the ear has been discharging continuously. Was under treatment most of the time. Every known agent used to aid resolution. Left membrane greatly contracted and dull in color. Hearing distance—Right, 4-20 ; Left 6 20. Advised excision and left ear inflated by catheter. Malleus alone found diseased and excised. This was the first case in which the membrane was not excised. Suppuration ceased in three weeks. As I was about to discharge patient, he called my attention to deafness in left ear, which had now begun to suppurate. It required two months' treatment to conquer this condition. Hearing worse in left ear, about the same in right.

CASE 4.—A man of thirty dates his ear trouble to scarlet fever, contracted during his tenth year. Left ear affected. Profuse offensive discharge, intense tinnitus ; and occasional vertigo. Had had several growths removed. Hemorrhage was a frequent occurrence, so often, and of such quantities, as to prove annoying and alarming. The membrana tensa was very succulent and congested in this case ; and the profuse hemorrhage caused considerable inconvenience and embarrassment during the operation. Hearing 6-20, not improved by the operation. Both bones were greatly necrosed ; almost free from all attachments. This case is still under treatment, after four months, but has greatly improved, and I hope soon to record it among my successes. The discharge has greatly lessened and is no longer offensive ; the subjective symptoms have all disappeared ; and the hemorrhages are a thing of the past.

CASE 5.—A young woman of thirty-five. Has had a chronic purulent discharge from left ear since infancy. Had been subjected to treatment of all kinds and character, regulars, quacks and homeopaths, both at home and abroad, without result. Had a perforation of an oval shape about four millimetres in diameter, situated in the lower half of the membrane and involving the umbo. A small polypoid growth was attached to the upper part of the membrane, which, she states, had been removed ten or more times. Discharge quite profuse and offensive. After re-

removal of polypus, upper and posterior borders of perforation were found adherent to promontory. Hearing only of loud tones, almost on contact. Necrosis of tip of malleus diagnosed and excision advised. The excised malleus presented condition expected. Profuse watery discharge occurred for several days after operation until the tenth day, when discharge ceased, and the patient was discharged cured. Hearing distance for ordinary conversation, five feet. This last case does not belong to this class of cases but is of sufficient interest to be here reported.

In conclusion, I will simply add the conclusion made by Dr. C. H. Burnett in his paper upon this subject read before the American Medical Association at its last meeting in this city.

"The operation has not failed to stop suppuration, or greatly diminished it, in all cases of chronic purulent otitis media in which the writer has applied it.

"2. In attic cases with normal atrium, the sole perforation being in the membrana flaccida, this operation is the only means of cure.

"3. By this operation, in cases of chronic purulent otitis media, in which the sole perforation is in the membrana tensa and is comparatively small, and while the purulency is limited to the anterior part of the drum cavity, the suppuration is promptly checked, before it has had an opportunity to attack the posterior portion of the drum cavity. Thus mastoid inflammation and necrosis, sinus thrombosis, pyæmia and cerebral abscess are prevented.

"4. If any hearing exists before the operation, it (frequently) invariably improves after the excision.

"5. Vertigo, headache, tinnitus, and the ordinary attacks of earache from 'gatherings,' so common in chronic otorrhœa in children, are entirely and permanently relieved by the excision of the necrotic remnants of the membrana tympani, and the two larger ossicles."

A CASE OF SINUS THROMBOSIS, ATTENDED WITH REMARKABLE OCULAR SYMPTOMS.

By A. MARMADUKE SHEILD, M.B., F.R.C.S.,

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HOSPITAL.

ON March 25, 1892, I met at the Shooter's Hill Cottage Hospital, Drs. Wise, Smith, and Sidney Worthington, regarding the following case which presented some striking clinical phenomena.

The patient, a man aged thirty-five, had long suffered from right otorrhœa. He came under Mr. Wise's observation on March 12th, previous to which he had been under medical treatment for what had been considered an attack of influenza. Mr. Wise recognized that the patient was seriously ill, with pains in the head, fever, and occasional rigors, but there was no sickness. The right eyeball was more prominent than the left. There was a purulent discharge from the right ear with considerable pain and discomfort. Dr. Mitchell Bruce saw the patient in consultation on the 13th, and advised surgical interference, which unfortunately was absolutely declined. On March 14th, complete right ptosis was present, but this improved, and three days later, left ptosis appeared, which has since persisted. Slight right facial paralysis was also now noticed. The intellect remained fairly clear, but there were occasional fits of wandering and slight delirium. The temperature throughout was of the pyæmic type.

On examination, I found a man of powerful frame, emaciated, with a sallow icteric skin, evidently in a condition of desperate illness. He lay supine, with a dry cracked brown tongue, in a lethargic and drowsy state. A most remarkable feature in the aspect of the patient was the extraordinary protrusion of both eyeballs. Indeed, at first sight, one might have well pronounced

the man to have been suffering from double sarcomatous tumors pushing forward the eyeballs. The lids were greatly engorged, the veins in them unduly prominent. On the left side the prominent eyeball was partly concealed by the drooping lid. The left pupil was greatly dilated, fixed, and not acting to light. There was no strabismus. On examination with the ophthalmoscope well-marked optic neuritis was found to be present. Near the root of the nose was a hardly perceptible red streak ; on passing the finger lightly over this, a thrombosed vein was plainly detected. From the right ear issued an abundant offensive discharge. The membrane was entirely destroyed, and exuberant granulations were seen towards the inner wall of the tympanum. There was no œdema or tenderness over the mastoid, but there was distinct fulness and local tenderness over the region of the internal jugular vein in its upper part. Owing to the illness of the patient the back of the chest was not examined, but the man breathed easily, and nothing abnormal could be detected anteriorly. There was no implication of the joints, no petechial rashes on the skin, no tender spots on palpation of the muscular parts of the limbs. The patient could distinguish those about him ; his intelligence seemed good ; he gave his address promptly, and answered questions without manifesting that sluggish cerebration so commonly observed in cerebral abscess. This was remarkable considering the serious pathological conditions obviously present.

No operative treatment was advised and the patient died comatose on the first of April. The thrombosed vein at the root of the nose suppurated just before his decease.

I refused operative treatment upon the following considerations.

The extraordinary protrusion of the eyeballs was certainly dependent upon venous engorgement. This was due to blocking of the cavernous sinuses by clot, which extended by way of the petrosal and transverse sinuses, from the right lateral sinus. The angular and frontal veins were also thrombosed. The evident implication of the third nerve on the left side was due to pressure in the cavernous sinus. The right facial paralysis, was due to direct implication of the trunk of the seventh nerve in the aqueduct of Fallopius. The origin of the mischief was caries of the right mastoid and thrombosis of the lateral sinus. The marked implica-

tion of the jugular rendered systemic infection likely. The sinuses at the base of the brain being filled with septic clots, the meninges could not fail to participate in the inflammation. The condition of desperate illness was much against the operation of tying the jugular vein, and opening the lateral sinus; such a proceeding could hardly have improved matters in such a hopeless case.

Permission was obtained with some difficulty to examine the head *post-mortem*. The following is a copy of the letter kindly sent me by Dr. Worthington, who made the autopsy.

"The post-mortem to-day showed just the condition that you anticipated. After you saw him suppuration occurred about the frontal vein, and about two drachms of pus discharged about the inner canthus. Then he had one or two minor rigors, became unconscious and died. There were three small abscesses the size of a pea on the cerebral cortex, and a fourth in the right corpus striatum, all evidently secondary (embolic). The ophthalmic veins were full of firm thrombus; the cavernous sinuses full of pus, also the right petrosal sinus. The right lateral sinus contained pus and clot; the bone adjacent was rough and infiltrated with pus; the adjacent surface of the cerebellum and medulla coated with purulent lymph. The superior longitudinal sinus was normal. The chest and abdomen were not examined as we only had permission to open the head."

The chief points of interest in this case are the remarkable ocular symptoms which occurred early and which were certainly difficult to explain. The fact of the patient living so long is also of interest, as affording an additional argument for early operation in these cases. Had the jugular vein and right lateral sinus been opened and irrigated early, the recovery of this man would have been very probable. In the ordinary accounts of lateral sinus thrombosis and sinus pyæmia, no mention is made of the possibility of occurrence of thrombosis of the cavernous sinus and protrusion of the eyeballs. Cases of sinus thrombosis due to caries of the mastoid remind one forcibly of the pathological conditions observed in "phlegmasia alba dolens" due to septic matters entering the iliac veins.

Thrombosis of the cavernous sinus is not a common affection. At the Medical Society of London on March 26, 1886, Mr. Gould brought forward a case resulting from alveolar abscess. Other cases have been related due to extreme anæmia in young girls, necrosis of the bones of the nose, fractures of the skull, and such affections of the face as carbuncle. The ear is so far removed from the eye, that it seems, at first sight, unlikely that caries of the mastoid could produce thrombosis within the orbit. The case related, however, illustrates this important fact—important to the aural surgeon, the oculist, and the physician. The signs and symptoms of sinus pyæmia have lately received full recognition and I need not repeat them; I would add to the list the possibility of exophthalmus, unilateral and bilateral. The literature of diseases of the ear takes but scant notice of cases of cavernous sinus thrombosis. Politzer refers to its possibility and quotes two cases where he saw the morbid preparations, and lays stress upon the curious and complicated symptoms that are apt to arise. He mentions exophthalmus, ptosis, and various oculo-motor paralyses. Most of the more recent writers on aural diseases, however, do not even mention the subject. In the general literature of thrombosis of the cerebral sinuses, also, cavernous sinus implication is not much discussed.

The object of relating this case is to call attention to the fact, that early thrombosis of the cavernous sinus may give rise to curious and diverse ocular phenomena, which may in their turn be dependent upon disease of the petrous or mastoid bone. This consideration is as interesting to the ophthalmic as to the aural surgeon, and adds another symptom for consideration to the group generally related by authors as characteristic of sinus thrombosis in diseases of the ear.

ON THE CONNECTION BETWEEN DISEASES OF THE NOSE AND NASO-PHARYNX AND SOME DISEASES OF THE EYE AND EAR.

BY DR. J. A. SPALDING, PORTLAND, ME.

IT is sometimes difficult for one who makes a specialty of diseases of the eye and ear to help his patients unless he is thoroughly competent to treat diseases of the nose and naso-pharynx. To a certain extent, also, he should be able to examine the larynx, for if he can tell whether it is diseased or not he can make a skilful diagnosis between affections of the naso-pharynx (which are largely connected with diseases of the ear) and those exclusively of the larynx.

I have had under my care, of late, a case of deep stricture of the lachrymal duct, in which no appreciable improvement could be obtained until hypertrophies of the turbinated bone on the same side had been successfully treated with chromic acid. When this had been accomplished, the lachrymation significantly decreased, and soon ceased. Owing to an oversight of these conditions in the nostril, the case had long been treated in vain by competent men. It is not every case that is so brilliantly successful, but it shall serve as an introduction to this paper.

Whilst meditating over this article I received from a noted aurist in London a series of questions asking if there were any connection between hypertrophy of the turbinated bones and deafness, and if the treatment or the removal of this state of affairs in the nose were not generally followed by marked improvement in the aural symptoms.

I replied that I had seen several patients in whom tinnitus and deafness had been associated with nasal hypertro-

phies and that after cauterization with acids much improvement in the condition of the ears had been observed. But that this could not be exclusively referred to the treatment of the nasal affection, because, together with this, careful attention had been paid to the ears. Still the benefit being on the whole greater than I had often seen after treatment of the ears alone, it was undoubtedly true that the care of the nose had contributed largely to the rapid improvement in the hearing. Finally it was my opinion that just as good results might be obtained by the use of acids, as by instrumental removal of the hypertrophies.

This recent case of lachrymation relieved by paying attention to the nose, and the receipt of this communication from London, are my reasons for bringing up for discussion the connection between diseases of the nose and nasopharynx and some diseases of the eye and ear.

Let us first insist that a large number of cases of stricture of the lachrymal passages are solely due to the extension of a catarrhal condition of the mucosa of the nose to that of the lachrymal duct, and that it is well-nigh impossible to treat with any degree of success the lachrymation without fortifying the local treatment (probes, styles, astringents, antiseptics, etc.) with care for the nasal mucosa.

How interesting here it is to note how a patient from the country with diseased tear-passages begins to improve with the change of air from that of the country to that of the sea, showing that the theory of the connection between the condition of the nose and that of the eye is not so far amiss as some might be inclined to think at first sight. Hence in the improvement on changing the patient's locality we find our starting-point for the rational treatment of the lachrymation. That is to say, the lachrymation often decreases under changed surroundings before we may have done much for the treatment of the patient, a point which the competent observer will not fail to grasp and to utilize at once.

Again, patients occasionally consult the oculist for dull pain around or above the eyes. Here we often find that the eyes are not at fault, the trouble lying in the extension of a rhinitis into the cavities above the eyes, and in direct con-

nection with the nostrils. In such cases we are to exclude errors of refraction, or possible abnormalities in the muscles of the eyes, whereupon we can confidently advance to the treatment of the catarrh which we are sure to discover under such circumstances.

Still another set of cases, with this same nasal connection, is that of obstinate ulceration or abscess of the cornea in country patients in the fall of the year, where a barb of grain has grazed the cornea. If there is the least tendency to lachrymation the muco-pus from the occluded sac wells up over the cornea, the bacteria invade that tissue, and in many cases the eye is irretrievably destroyed.

Finally, I may quote that very rare and perhaps doubtful case reported by Coretoux (*Annales d'Oculistique*, Nov., 1891), in which a patient with serous iritis was not at all benefited by merely local treatment to the eye, till this was abetted with the application of the actual cautery to the ozænic nostrils.

The same author mentions cases of conjunctivitis in which after careful treatment had failed, cauterization of the PHARYNX was followed by a distinct amelioration in the conjunctiva. He insists that all conjunctival diseases which show a tendency to encroach upon the cornea are of nasal origin. And in concluding he suggests: that the proof of naso-pharyngeal origin of many eye diseases is demonstrated by the cure of the latter after solely treating the naso-pharynx by the fact that some are only cured by treating both the eye and the naso-pharynx; and finally that where the nose cannot be successfully treated owing to abnormalities, or where its treatment is neglected, local remedies to the eye are of but little use.

Having thus established the fact, that there can be no reasonable doubt of a connection between some diseases of the eye and the nose, it is proper for us to pass in brief review the best means by which to bring about a rapid cure in such cases. Afterwards we may return to the better established connection between the naso-pharynx and the ear.

Leaving aside for a while hypertrophies of the turbinated bodies, we may assert, without fear of contradiction, that

nasal catarrh in its various types is incurable in a New England climate, incurable in the strict sense of the word, as when we say a patient has been cured of a fever so that he goes about apparently as well as ever, or he has been cured of an iritis, in the sense that the eye is perfectly restored to its functions, and has suffered no deterioration of vision. Now we cannot say this of catarrh in our climate. The fact that new remedies are being continually urged upon our notice, is proof that nothing so far discovered has been of permanent value. Nevertheless, as it is this disease which causes the diseases of the eye to which we are now referring, we must say a few words on the general principles upon which catarrh must be treated if we hope to be of assistance to the eye. Of course it is not every case of catarrh in which there is a lachrymation of the eyes, but on the contrary there can be no doubt that in almost every lachrymating eye there exists a more or less catarrhal condition of the nasal mucous membrane. Hence in every case of lachrymation we should first consider the refraction of the eyes, then the condition of the conjunctiva and cornea, then that of the puncta and canal. Next we resort to probes, and finish the examination with a minute inspection of the nostrils. Now if treatment of the latter is necessary we cannot hand over our patients to a rhinologist, and thus compel them to the double expense of a visit for the passage of the probe and another for the treatment of the nose, but we must, as all reasonable persons will allow, know what to do ourselves.

It is not my purpose to enter here on a prolonged discussion of the proper treatment of the diseases of the nose, but I may venture to suggest the line that will be of the greatest benefit in these especial cases.

In simple chronic rhinitis we must insist on proper cleanliness of the parts, washing them out with a solution of bicarbonate or baborate of soda and glycerine, and various aseptics. Or we may use Seiler's tablets which being dissolved in hot water can be passed through the nostrils with some appropriate instrument. Then we resort to sprays of benzoïnol with various essential oils, or to a combination of

benzoinol with aristol, or to the use of iodine with the iodide of potassium or to the chlorate of ammonium, or the permanganate of potassium. In fact, the remedies are innumerable. But it seems to me that finely atomized sprays, are best in common rhinitis, the iodine in the slightly hypertrophic conditions, and if there are crusts, they can be removed and the underlying surfaces treated with powders, or various acids, or astringents, amongst which the preparations of zinc are at present much thought of. Solutions of the bichloride are often available, and the same may be said of iodoform.

Powders are occasionally useful, but they are rather dirty. They are to be tried when other remedies fail. We may thus use calomel, alum, morphia, bismuth, or iodoform, and I have seen cases in which nitrate of silver in lycopodium powder proved very available. But the cases in which silver is appropriate must be picked. On the whole, we get the best results from liquids, because they can penetrate into every cranny and fissure, whilst powders only attain the parts that they directly touch.

Some practitioners resort to caustics in common rhinitis, but these may generally be better reserved for those cases of distinct hypertrophy in which the probe visibly sinks into the swollen mucous membrane.

Whenever a lachrymating eye is accompanied with moderate hypertrophy in the same nostril, and caustics do not seem especially indicated, I have found great benefit from the daily use of a Goodwillie nasal bougie. Even where there is no hypertrophy, but simply a contraction of the nostrils, congenital or otherwise, it is well to try this simple means of enlarging the nasal passages. It is not painful, but to nice persons it is somewhat disagreeable.

Medicated bougies are also highly praised, and these may be tried when other remedies fail to relieve.

If the nasal disease is one of actually enlarged, turgescient, swollen, and yielding hypertrophies, surgical interference becomes a necessity. After carefully cleansing the parts, they are to be cauterized, with various acids, or actually removed with the snare or galvano-cautery, or with the galvano-

cautery knife. Nitric, glacial acetic, and chromic acids are the ones most commonly employed, and there is but little to choose between them, the only caution necessary being not to cauterize too extensively at any one session lest severe constitutional symptoms supervene. For this reason I have generally favored chromic acid, but it is said that the galvano-cautery is far safer than any acids. This, as we learn from the authorities, ought to be used red-hot, for if only black the pain is intense, and if white-hot there is some risk of abundant hemorrhage.

If the nasal douche is employed in cases of catarrh, the greatest care should be given to having the water warm enough and not too salt, and more important still, the hot-water reservoir ought not to be raised too far above the head, lest the force of the stream cause irritating fluid to enter the middle ear, and excite inflammation which may be difficult to cure. On the whole the use of the nasal douche ought to be avoided, and the patient at all events should be most carefully instructed in its use.

One word in regard to cotton tampons lately advised in the treatment of catarrh: Do not let them remain too long lest they excite inflammation of the mucosa that may extend to the middle ear and endanger the hearing. Nor should the practitioner of general medicine feel hurt, if we mention here that, after plugging the posterior nares for obstinate epistaxis, the plug should not be allowed to remain too long *in situ* for the same reason as above mentioned, as cases in recent otological journals sufficiently prove. Thus Gellé at a recent meeting of the Parisian Society of Laryngologists, mentioned a case of serious otitis suppurativa appearing on the second day after plugging the nares, and on the fourth day the nose and external meatus of the ear were flowing abundantly with pus.

But we are delaying too much over details, and the most important part of our paper has not yet been reached; by this I mean the significant connection between diseases of the naso-pharynx and those of the ear.

Although, as we have seen, it is asserted that diseases of the pharynx *often* excite diseases of the eyes, such claims

seem to me to be rather doubtful. There is, however, no doubt that this *occasionally* takes place.

When however, we come to the diseases of the ear, we find that difficulties in the naso-pharynx are in a vast majority of patients the sole cause of the disturbance. Indeed we may assert that almost every one of the diseases of the middle ear owes its origin to some inflammatory disturbance in the mucosa of the naso-pharynx, extending through the tubes into the tympanum. When we reflect additionally, that nine-tenths of the usual diseases for which the aurist is consulted are located in the middle ear, and that almost every case of deafness is due to some disturbance in the naso-pharynx, it is plain that the aurist must, as a part of common-sense education, know something about the naso-pharynx, if he expects to maintain the confidence of his patients, to say nothing of relieving them of their deafness. The truth of this is visible in the attention given in every otological journal to the department concerning the naso-pharynx and its diseases.

If the rhinologist were to claim that these throat patients ought to be referred to him, the aurist would have but little to do, for so-called "throat deafness" composes about nine-tenths of all the patients that the aurist is called to prescribe for.

Let us here look for a moment at those cases of acute otitis media occurring during the course of the exanthemata. Since the aurist rarely sees such patients till long after the drumhead has been ruptured, and the meatus filled with pus, I need not lay much stress on the connection between the naso-pharynx and the middle ear, for it is too plain to be disputed, nor upon the treatment of the same in the early stages. The physician is busy with the bodily state of the patient, who is often seriously ill, and the ear is neglected. Much stress has been laid in many medical journals on the duty of the physician in such cases, and he is often blamed for not calling a consultation. It seems to me, however, that I can recall a large number of patients with *spontaneous* cure of suppuration from the middle ear, with perfect restoration of the hearing. For this reason I

fail to see the need of the persistence with which the charge of neglect is brought by the specialist against the general practitioner. Although of course it would seem to be a necessity to perforate the drumhead artificially, so as to liberate the pus, yet it may be replied that we see cases in which this has been done *secundum artem*, yet the patient remains more or less deaf. But really the question whether or not the hearing is to be affected after the exanthemata, does not so much depend on the perforation of the drum-head, as upon the action of the pus on the ossicles. If so abundant as to bury these deeply, then the delicate articulations, and consequently the hearing, suffer, whilst if caries ensues as the result of prolonged neglect, the ossicles may be seriously injured and enormous loss of hearing ensue.

In a scientific point of view, it would be better to have consultations, but as the drumhead may not be ready to perforate at the precise time of the consultation, or may previously have perforated, the resulting loss of hearing will be the same so far as the actual consultation is concerned. Once perforated, however, no means should be neglected to bring about a rapid cure. For this there is nothing more efficient than the alcoholic treatment. This consists in the use of a supersaturated solution of boric acid in equal parts of alcohol and water, or pure alcohol. This is to be warmed, and poured once or twice daily into the ear. As the discharge thins out, use the lotion less often. Some patients recover more rapidly after resorting to the *dry treatment*, which consists in filling and keeping full the meatus with finely desiccated boric acid. As the discharge wets the powder, use more. It may be poured into the passage from a spoon and then pushed in with a bit of cotton on a wire. More cases can be cured by this method than by any other. Occasionally it has been brought into disrepute by the powder hardening in the meatus and causing pain. But if we syringe out the meatus as soon as this symptom declares itself, and then push in more acid, the pain disappears. If the pain recurs, some other treatment may be tried, such as simple astringents, or the alcohol as above mentioned.

The prevalent influenza often attacks the ear, and a simi-

lar condition of things is witnessed as after the exanthemata. On the whole the pain in the otitis of influenza is in my experience more severe than that during the exanthematous ear diseases.

The greatest proportion of disease of the middle ear attaches itself to the ordinary chronic catarrh of the middle ear, the common type of deafness all the world over. Nine tenths of the cases of deafness that we meet with are due to this form of disease. It begins with a dryness of the mucosa of the tympanum, then of the mucous layer of the drumhead, gradually the articulations of the ossicles become stiff, and the movements of the stapes in its window limited. Together with a dryness of the mucous layer of the drumhead, we have contraction of its delicate structure, so that it can no longer vibrate with facility; the hearing first diminishes for distance, then for public speaking, and finally for ordinary conversation. It is no exaggeration to assert that almost every case of this sort originates in some catarrhal condition of the naso-pharynx. Not that every patient with catarrh of the ear is affected with the ordinary nasal catarrh. Far from this. Still the mucous membrane of all these patients is more or less irritable. They take cold easily, they suffer from tinnitus long before any loss of hearing is observed; they often perceive a sensation of fulness in the ear, and they are very susceptible to sore throats.

When such patients consult us one of the first necessities is to examine the naso-pharynx. We must see if the mucous membrane is normal, if it is smooth or ragged, if the tonsils are enlarged, if the uvula is elongated, and generally if the pharynx is affected. How is the aurist to know if these conditions are normal unless by constant observation and study? And there lies the essence of this paper: that both the oculist and the aurist must from sheer necessity be, if not actual specialists in diseases of the naso-pharynx, at least skilled students in the diseases of this region before they can practise their specialty. They must know about these diseases, only calling in a consultation when surgical interference seems advisable, as in polypi, exostoses, enchondromata, tumors generally, and in deviations of the septum.

Having determined what to do for the ear, we must add the proper treatment for the naso-pharynx, and here a few suggestions may be offered. In posterior naso-pharyngitis we use a cleansing solution as before suggested in speaking of nasal catarrh. Oxide of zinc or nitrate of silver powders may follow, or others, depending on the idiosyncrasies of the case. If there are crusts, they must be removed, and the underlying surface treated with glycerite of carbolyzed iodine, or sulphate of copper, or acetate of lead, etc.

It is generally well to direct the internal use of tonics, or alteratives in connection with the local treatment.

We often find great benefit in these cases by passing through the nostrils, and then causing the patients to blow them out of the mouth, various vapors such as those of menthol, thymol, aristol, etc., in albolene or benzoinol. Aristol I have lately used with considerable benefit, but it will take time to decide if it has any advantages over other remedies. Where the patient can force the vapor back through the pharynx and so out of the nose, as does the tobacco smoker, it ought to be tried, as thus the parts will be more thoroughly treated.

Adenoid vegetations should be scraped or cauterized with acids or the galvano-cautery. The variety of instruments suggested proves that no perfect one has yet been devised. In the removal of these vegetations we are warned of the dangers of hemorrhages, but it is possible that these are the exaggerations of the specialist. When the vegetations are small and flat, they may be touched with the galvano-cautery, the hot wire being employed over a small surface at a time. The result of the removal of the vegetations so far as the hearing is concerned is generally good. I have seen patients in whom the operation had been done without relief to the hearing, which was however obtained on resorting to the bag and catheter, which proves that, generally, the treatment of the vegetations and the ear should go hand in hand.

When the tonsils are so large as to impinge upon the tubal orifices, or if they are so swollen as to reduce the pharyngeal orifice, they should be removed. I will not at this place enter into a discussion of the question of abscising

the tonsils with the knife, or of repeatedly touching them with the cautery, but I will suggest that few patients will submit to repeated operations, when the tonsils can be removed at one session by an operation which they have always understood is perfectly safe.

Gargles are often recommended in cases of deafness in chronic or acute pharyngitis, but gargling can only be done effectually by partially swallowing the substance and then regurgitating it, in which case the entire pharynx is wet with the gargle employed. Generally it is best to apply the desired remedy with a brush. The old remedy glycerotannin is very useful here, and can be relied upon as a change at any time.

Many cases of sore throat, insidiously creeping into the middle ear, and leaving traces behind in loss of hearing, are reflex in their origin, proceeding from wet feet or an overloaded stomach, or from constipation. Such attacks can often be aborted by the use of a cathartic. Patients so afflicted should be urged to keep their feet dry, and to dry them as soon as possible after once being wet. The best local application is the nitrate of silver in a twenty-grain solution. Weaker solutions are of no value, and even stronger may be used without risk, if not too abundantly employed, in which case they may flow into the larynx and excite a dangerous spasm.

We may pass over by mere mention, the diagnosis or treatment of acute tonsillitis, syphilitic or tubercular pharyngitis, and many diseases in this region, because they have no connection with diseases of the eye or ear.

Let us in conclusion turn our attention to the larynx.

Just as the oculist ought to understand the anatomy and normal conditions of the mucosa of the nose, in order to enable him to treat understandingly a number of diseases of the eye, and as the aurist should know much about the naso-pharynx in order to comprehend the significance of certain diseases of the ear, so in my opinion both oculist and aurist ought to know something about the normal relations of the larynx. Thus the aurist, in a case of apparent pharyngitis with deafness, ought to know that the case is not

actually one of tubercular laryngitis; and the oculist, in a case of weakness of vision with a huskiness of voice, after pharyngeal diphtheritis, ought to be able to verify in the larynx in the presence of a paralysis of the vocal cords an associated paralysis of the accommodation.

Thus, I recently saw :

Miss A. recovered rapidly from diphtheritis, but soon developed loss of voice, together with loss of vision for near objects, so that to all intents and purposes she was speechless, and without useful vision. The diagnosis was made of simultaneous paralysis of accommodation and of one or both vocal cords. The examination with the laryngoscope revealed a characteristic paralysis of the left vocal cord. All of these conditions disappeared after the use of strychnine hypodermatically.

It is beautiful to see within the eye the patches pathognomonic of Bright's disease, or to observe through the translucent drumhead the accumulation of serum within the tympanum. But to me a sight still more beautiful is the pulsating vibrations of the vocal cords, when fully illuminated. Every physician ought to be able to catch this image momentarily, even if from the extreme rarity of cases he may never see a tumor of the larynx or be asked concerning the propriety of its removal. Many as are the rules laid down for the accomplishment of this illumination, my experience tells me that it is largely a matter of light, and of tact in the management of the mirror.

Even after the larynx appears sufficiently illuminated, but when we as yet can see nothing but a reddish tube, it requires a twist of the fingers, a turn of the mirror this way or that, to enable us to bring out in its full beauty the pallor of the vibrating cords.

There was a time, not long ago, when every ophthalmic surgeon was an ophthalmic surgeon and nothing more, and when the aurist treated the ear and nothing else. Nowadays the eye and the ear are being more and more treated together by the same surgeon, who is called both oculist and aurist. The reason given for this union of the two specialties is the extreme importance of the especial senses

of sight and hearing. Now I would go further still and urge that the eye and the ear, the nose and the throat, ought all to be treated by the same specialist, on the ground of the connection of all of these organs to a greater or less extent, through the anatomical connection of the adjoining cavities of the head. When this is brought about, we shall, for example, cease to see patients urgently in need of local treatment to the mucous membrane of the middle ear to prevent deafness, being treated for their throats alone, and all the time consoled with the assurance that with the disappearance of the throat symptoms the hearing will return, which it fails to do, having been too much injured by the long delay. It is as plain a duty for the throat specialist to send such cases to one who understands the ear, as it is for the oculist to transfer at once to the practitioner for skilful help, the patient presenting himself with the patches and the retinal hemorrhages indicative of Bright's disease. Hence in the union of all these specialties the profession of medicine would be advanced.

The larynx being an important organ of speech, and so many people making a livelihood by singing and elocution, it is imperative that much attention should be given thereto. But the difficulties of examination and of manipulation are so great, that there always will be and ought to be specialists to attend to the same. These, too, could follow out the tumors and rare cases about the nose and naso-pharynx, and so act as consultants. Nevertheless, no one but the most skilful should be permitted to touch the larynx, lest the ignorant application of a caustic, or the unskilful tearing of a tumor from the cords or cartilages should excite spasm of the glottis or œdema of the larynx, and the patient's life be endangered.

THREE CASES OF EPITHELIOMA OF THE AURICLE.

BY DR. J. A. SPALDING, PORTLAND, ME.

EPITHELIOMA of the auricle is somewhat of a rarity, and as I have lately seen three cases, but found hardly any mention of the subject in either the text-books or magazines, I venture to report those of my own observation in brief.

The FIRST PATIENT was a man of forty-one who had always been healthy, and had no family history of cancer, unless a brother with a "tumor," belonged to this diathesis.

The patient first observed in January, 1890, a small scar on the helix, but so far back that he could not see it unless by bending the entire auricle forward and looking at the reflection in a looking-glass. As the scab was slightly irritating, he fell into the habit of scratching it, and making it bleed, whereupon the irritation would generally cease. In the course of the following summer and fall, the scab extended farther along the edge of the helix and auricle till it measured about 1 *cm* in length, and seemed to sink deeper into the tissues, since the whole structure felt harder than normal. The irritation at times increased to severe pain, robbing the patient of his sleep.

The operation was performed by the surgeon in charge at the Maine General Hospital in November, 1891, with an ordinary scalpel, and consisted in removing a V-shaped piece of the auricle, embracing all the tissue involved, and also some apparently healthy. The margins were then sutured and the recovery was good, though owing, as I think, to the presence of the stitches, there was much swelling of the parts for the first two or three days.

The portion excised was examined under the microscope, and discovered to be a genuine epitheliomatous mass with signs of malignancy.

The patient was discharged in ten days, apparently well, but in February 1892, he re-appeared with the tumor larger than before, and constantly painful.

At the second operation, the diseased tissue was removed even more abundantly than before, so that the auricle was reduced to a misshapen stump. This time too the margins were sutured instead of being strapped together as in my opinion they should have been.

The patient was dismissed in a few days, the field of the operation looking perfectly healthy, but the auricle hardly recognizable in form owing to the operations to which it has been subjected.

The SECOND CASE was that of a man with no family history who had suffered for three years with a ragged sore behind the helix of the right auricle, and extending along the furrow where the auricle is attached to the skull, and burrowing beneath the healthy tissues.

The bleeding surface was about $1\frac{1}{2}$ cm in length, upon the rear of the auricle, and extended deeply into the external meatus, and also across the insertion of the auricle over upon the mastoid process. The mass on the auricle was carefully abscised without cutting too deeply into the cartilage, and that portion of the epithelioma in the fissure behind the auricle, as well as that extending over upon the mastoid was scraped away as abundantly as possible. The really epitheliomatous tissue did not appear to extend deeply into the meatus, as at first appeared. Recovery took place by granulation in the cavity, and by first intention upon the auricle, and an apparently good recovery had been made at the time of the patient's discharge. The microscopic examination left no doubt of the true epitheliomatous nature of the foreign mass.

Three months later, there was no relapse.

The THIRD CASE was that of a man of sixty, who for the previous five years had perceived in the rear of the left auricle, by the sense of touch, a hard nodule without irritation, pain, or hemorrhage. Lately it had been broken open on the surface, begun to be painful, and to bleed easily if touched in the slightest degree. The nodule was situated about on a level with the external meatus, on the rear of the auricle, and immovably attached to the same. The operation consisted in abscission with the knife, the incision ex-

tending deeply into the cartilage of the auricle, but an effort was made to dissect off the morbid tissue without removing any more of the cartilage than was absolutely necessary. The result was apparently good, in that after four months there had been no relapse. The microscopic examination of the tissue removed, showed the characteristic cells of epithelioma.

The aim of the surgeon in these cases should be to remove as little of the cartilaginous tissue as possible, in order to avoid a noticable deformity in the auricle. Personally I should use the sharp spoon and scrape away all the morbid tissue wherever feasible. If this cannot be properly done so as to ensure the patient reasonably from a relapse, then the knife may be employed.

Would it not be better to use the sharp spoon in every case of auricular epithelioma, to dig and scrape away all the tissue affected, and then to cover the resulting cavity with a skin graft from some healthy portion of the body?

My experience is rather in favor of strapping the margins together in these cases, than to use sutures. If the latter seem indispensable, they ought to be as close together and as fine as they can be made. I well remember a very renowned aurist saying some years since, that he would never use a suture in operations of any sort on the auricle, or in cases of injury of that organ; that the parts could always be better adjusted by straps than by sutures of any sort, that the disfigurement was less, and that there was less danger of sloughing and erysipelas from strapping than from the use of sutures. I also recall a conversation with the late James Hinton, in which he expressed a preference for the use of straps. Politzer so far as I can discover does not say anything against the use of sutures. He advises an interrupted suture in incised wounds of the auricle, so that it would seem that he could not possibly object to the use of a similar suture after a simple incision for the removal of an epithelioma from the same structure.

It is a question with me, whether the abundance of the sutures in the first case may not have been the direct cause of the extreme swelling of the tissues and of the rapid re-appearance of the tumor in the same locality.

Whether epithelioma of the auricle is more prone to relapse than that in other regions of the body is still open to discussion. It would, however, seem at first glance as if the easy accessibility of this organ, and the great facility that it offers to the irritation of microbe-infested finger nails, would account for the apparent frequency of the relapse in precisely the same region upon the auricle and even after the most thorough removal of the tissues involved, when compared with the rarity of its reappearance in precisely the same region in the less accessible portions of the trunk or limbs.

In conclusion, so far as my personal experience is concerned, the greater frequency of epithelioma of the auricle in the male sex is worth observing. I do not remember how many cases in all I have seen of this morbid growth upon the auricle, but I have never yet seen a single case in a member of the female sex, young or old. Possibly if this is the experience of other aurists, there is a compensation of averages of epithelioma in the greater frequency with which the female sex is thus affected in other portions of the trunk, or in the internal organs.

CONDYLOMATA OF THE AUDITORY CANAL.¹

BY H. V. WÜRDEMAN, M.D., MILWAUKEE.

SPECIFIC lesions of the auditory apparatus may occur without concomitant symptoms in other structures. The systemic origin of the malady may thus be overlooked and the patients are treated for a presumable local affection without benefit. We occasionally meet with strumous subjects whose otorrhœa does not yield to local applications or operative treatment, in whom specific medication yields good results. The most frequent part of the organ of hearing to be attacked by the ravages of syphilis is the inner ear.

Among the external manifestations gummata are most common while condylomata are seen less often.¹ Some authors claim that the external auditory canal is not rarely the seat of broad condylomata.² However, statistics do not support this statement. Deprès³ examined twelve hundred syphilitics of whom nine hundred and eighty had condylomata but found only six such lesions in the external ear. Stöhr⁴ found them most generally in the middle portion of the canal and generally only in one ear. When at the meatus they are usually single but when deeper may be multiple.⁵ Otorrhœa usually precedes the lesion,⁶ the latter arising probably from the irritating nature of the discharge. Sometimes it appears in the form of a red and painful, ill-defined swelling, followed by the formation of painless granulation tissue which breaks down and discharges and is succeeded by ulceration of indefinite duration.⁶ These

¹ Read at a meeting of the Wis. State Med. Soc. in Milwaukee, May 6, 1892.

granulations appear much the same as in cases where there is no syphilis, being sometimes so large as to fill the canal.¹ The diagnosis is of course established by the history and concomitant symptoms.

Some months ago an interesting case of condylomata affecting the auditory canal came under my observation. The diagnosis was not apparent to me until after some weeks of treatment. The history was briefly as follows:

A lumberman came with suppurative inflammation of both middle ears which he claimed to have existed for three months and to have originated after a blow upon the head. Believing it to be an ordinary case of purulent tympanic disease no specific history was sought at this time. *Status præsens*:—Both ears discharge a foul smelling matter, the membrana flaccida on both sides being gone. On the inferior and posterior walls of the right canal, extending from the meatus to the remains of the drumhead, occupying a quarter of the caliber of the canal, is a granular raised ulcer, covered with discharge, which when cleansed appears reddish-gray and bleeds upon touch. H. D., R. and L.: loud voice at 2 m. Bone conduction good on both sides.

The patient has had ozæna for five or more years and there is a perforation of the septum with ulceration of its bony portion. He has a ferocious-looking moustache but the upper lip is devoid of hair for the space of two finger-breadths immediately under the nose, this place being the seat of an elevated excoriated patch. The middle-ear disease was readily relieved by antiseptic treatment but the ulcer of the canal seemed even worse after six weeks of cleansing and topical applications. The sore on the upper lip was likewise treated daily by ointments, etc., without benefit.

In sheer desperation I made a careful general examination of the case and after close questioning the man admitted having had a chancre of the penis followed by a clearly defined eruption and sore throat some fifteen years before. A diagnosis of syphilis had then been made and the patient treated for some months until the symptoms had disappeared. Since that time he had occasional attacks of sore-throat, rheumatism and skin trouble to which he had paid no special attention. I sent the man to Dr. D. J. Hayes in consultation who declared him to be suffering from late secondary symptoms and thought that the lip affection was a condyloma. The patient was put upon intra-muscular injections of corrosive

sublimate and iodides internally. The ulcers in the auditory canal and on the upper lip improved after the fifth or sixth injection and rapidly healed by the formation of cicatricial tissue. He was then supplied with ordinary "mixed" treatment and sent home: ears dry; no restoration of the drum membrane; H. D., R. and L. was watch on pressure, voice at 6 m; markedly improved in general health.

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HEAD INJURIES WITH AURAL COMPLICATIONS.

By J. E. SHEPPARD, M.D.,

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CASE I.—Wm. B., æt. forty-seven, laborer, b. in Germany, came Nov. 6, 1889, to the aural clinic of the Brooklyn Throat Hospital, giving the following history : On Sept. 1st he fell two and a half stories down an elevator shaft, striking on his head. Patient says, he was five days unconscious ; on regaining consciousness, had a violent roaring in his head. When he first got on his feet, he was very dizzy, feeling all the time as if pitching forward and to the left. This still continues ; has had no headache since the fall ; has never vomited. Within the past ten days (previous to that, he had, since the injury, been only moderately hard of hearing) his hearing rapidly failed, first in the right ear, three or four days elapsing between commencing and entire loss of hearing. Hearing in the left ear began to fail before that of the right was entirely gone, and at the same time he noticed a slight discharge from the left ear, unattended with pain.

From St. Catherine's Hospital, to which he was removed at the time of the accident, I obtained the following brief record : " Admitted Sept. 1, 1889, with a contused wound over the right eye. For two days he did not cerebrate normally. He then developed delirium tremens, followed by an attack of meningitis. During his stay in the hospital, he was hard of hearing, and complained of ' roaring in his head ' Ears not examined. No discharge noticed from either ear. Was not well when discharged."

Present Condition : Watch not heard in either ear. In right ear tuning-fork not heard by air-, and but slightly, if at all, by bone-conduction. In left ear, air-conduction better than bone-. Loud conversational tones heard 6" in left ear, not at all in right.

Right ear : External canal and *Mt* about normal in appearance.
Left ear : In outer part of cartilaginous canal is a small furuncle, already discharging. *Mt* has a small dry perforation in posterior inferior quadrant. Inflation improves the hearing slightly in the left, not at all in the right ear.

Treatment: Ordered pilocarpin muriat. gr. $\frac{1}{8}$, to be taken by the mouth three times daily. Left canal to be syringed three times daily with weak carbolic solution.

Nov. 7th.—Patient came to-day sweating profusely, profuse salivation, complains of general cold feeling. On questioning him, I found more than a grain of the pilocarpin had by mistake been taken in the twenty-four hours. Stopped the medicine.

Nov. 8th.—Hearing distance, right ear, watch $\frac{9}{16}$. Tuning-fork slightly by air-, better but poorly by bone-conduction. Left ear, watch $\frac{9}{16}$. Air-conduction better than bone-. Patient says the dizziness is markedly better than yesterday.

He now entered the wards of the Long Island College Hospital, and passed from my observation, with the exception of one visit I made to him by courtesy of and in company with Dr. Arthur Mathewson, Consulting Aurist to the hospital. Dr. M. considered that the symptoms indicated labyrinthine concussion, rather than a fracture at the base of the skull. About three months later I saw the patient once at the Brooklyn Eye and Ear Hospital. The dizziness had gradually diminished, so as to be no longer troublesome. The deafness and tinnitus were unchanged.

It is very unfortunate from a diagnostic standpoint that no careful examination of the ears was made at the time of the injury. In favor of concussion of the labyrinth are, the absence of discharge, either bloody or serous, and the rapid loss of hearing two months later, shown by the tuning-fork to be of labyrinthine origin. In favor of fracture of the temporal bone are, "the attack of delirium tremens followed by meningitis," the perforation of the membrane visible when I first saw him, and the great dizziness, which made the patient feel all the time as if falling to the left, and which persisted at least three months.

CASE 2.—Michael H., æt. thirteen, schoolboy, came Dec. 30, 1891, to the clinic of Dr. Hickok, at the New York Eye and Ear Infirmary, with whom I was at that time working, and through

whose kindness I am permitted to report the case. His mother related the following history: Some time during the previous summer he fell a considerable height from a bridge; following this he was several hours unconscious. There was a moderate hemorrhage from the left ear, and from the nose and mouth. There was no facial paralysis, and no marked dizziness.

Present Condition: Hearing distance, in right ear, normal. In left ear, conversational tones, 3-4 feet. Left canal was filled with pus. It was seen after cleansing that there was something in the bony canal about $\frac{1}{2}$ " outside the *Mt.* At the second visit, with thorough cleansing in the meantime, it became clear that this body was whitish in color, that it extended horizontally entirely across the canal, and that it was firmly fixed both in front and behind. With the probe it felt hard, and bone-like, and could not be displaced. The lumen of the canal was entirely filled except a small space below and behind, and another, less than pin-head-sized, space above and in front. On hasty examination these might have been mistaken for perforations in the membrane, so much did they resemble them. In three weeks, with thorough cleansing, suppuration had entirely ceased. When last seen, Feb. 6th, this body appeared to be moving slowly outward. Through the two open spaces could be seen what looked like normal membrana tympani beyond. There was no pain. Hearing had improved to more than six feet for conversational tones.

The diagnosis made by Dr. Hickok was "fracture of the temporal bone, with splintering," and he believed this body in the external canal was a splinter of bone working its way outward. As the body by its presence caused no untoward symptoms, while efforts at extraction were attended with severe pain, it seemed better to leave it alone and watch its progress outward.

CASE 3.—John F., æt. eighteen, carpenter, born in England, came to my clinic, at the Brooklyn Eye and Ear Hospital, Feb. 4, 1892, with the following history: Right ear has been deaf since childhood, supposed to be the result of scarlatina. Up to three years ago, the left ear was, so far as patient knows, normal. He was then struck on the left side of head, above the ear, with a piece of iron. He became immediately unconscious. Following this, which lasted several hours, was a mildly delirious condition, an interval of thirty-six hours lapsing before complete return to consciousness. Directly after the injury, the father says, there was, for a short time, a flow of blood from the left ear and

nose and, he thinks, also from the mouth. During the first few hours following the injury there were "to-and-fro movements of the eyes," nystagmus. Immediately on regaining consciousness patient found he was very hard of hearing. For a week or two there was great dizziness, which gradually disappeared. Two or three days after the injury there was noticed a slight purulent discharge from the left ear, which, however, lasted only a few days. There is occasional tinnitus. He has been under the care of able specialists, without improvement.

Present Condition: Hearing distance, right ear—only an occasional word if shouted directly into the ear. Tuning-fork heard only slightly by air-, a little better, but very poorly, by bone-conduction. Left ear—o for watch and whisper, 3" for loud spoken words. Tuning-fork heard much louder, and 24" longer by bone-conduction than through the air. Tuning-fork on the vertex is heard altogether in the left ear. Right external canal and *Mt* almost normal in appearance. In the left external canal, a large piece of inspissated cerumen. After its removal the *Mt* was seen to have a large dry perforation, the posterior superior and part of the posterior inferior quadrants remaining. The handle of the hammer, to which was attached the remnant of the membrane, ran backward and inward, and was adherent to the promontory. Both Eustachian tubes open freely, but without improvement.

Treatment recommended, was excision of the ossicles of left ear, which, being consented to, was done February 10th, in ether narcosis, after which the canal was lightly filled with iodoform gauze.

Feb. 11th.—Hears conversational tones 6".

Feb. 14th.—Has had for the past two days pain referred to the Eustachian tube. Hearing not so good.

Feb. 19th.—Pain has ceased. There is a slight purulent discharge. Conversational tones heard 3"—4".

March 1st.—Discharge has nearly ceased. Conversational tones heard 6"—8".

CASE 4.—Dennis D., æt. twenty-four, laborer, born in the United States, was first seen February 5, 1892, having been referred to my clinic at the Brooklyn Eye and Ear Hospital by Dr. Barber. The following history was elicited: On Nov. 2, 1891, was struck on left side of head and left shoulder with a heavy coil of pipe. While unconscious he was removed to Chambers Street Hospital, New York, and two days later he was taken to the Brooklyn

Hospital, where he was treated for "a dislocated shoulder, and a fracture at the base of the skull." He was not long unconscious. After regaining consciousness, he felt blood escaping from the left ear, the nose, and the mouth; felt also that the left side of his face was paralyzed. The facial paralysis continues, but has steadily improved since the injury. Ever since the injury he has been very dizzy, having still to watch his steps most carefully to keep from falling.

Present Condition: Hearing distance, right ear, normal; left ear, watch, $\frac{9}{16}$; whisper, 2"; conversational tones, 3'. Bone-conduction better than air-. Weber's test, turning-fork heard in left ear.

Right ear: External canal normal. *Mt* very opaque, considerably retracted. No light reflex in the normal position; a small point of light above the short process.

Left ear: Deep in the external canal is a mass of *débris*, consisting of dried blood, epithelial scales, etc. Walls of bony canal very red. Along the anterior superior wall about a quarter inch outside of the membrane is a small piece of dried blood still adherent. *Mt* very opaque, no light reflex, hammer vessels injected. No perforation or cicatrix visible. Eustachian tubes open readily, increasing the hearing in left ear to 4" for whisper. No paralysis of the palate muscles.

Treatment: Patient was already taking from Dr. Barber a mixture containing iodide of potassium and fl. ext. ergot. This was continued. The *débris* was removed from the external canal with probe and curette. Inflation. Blister behind and below the auricle.

Feb. 12th.—Hammer vessels much less injected; hears whisper 8".

Feb. 23d.—After inflation, whisper heard two feet.

March 4th.—Hears whisper twelve feet. Dizziness and facial paralysis are slowly improving.

These three histories I have recorded together as presenting a group of cases seen in rapid succession, and having several symptoms in common. In each case there was a considerable period of unconsciousness, together with hemorrhage from the ear, nose, and mouth. In each, the sound-perceiving apparatus seems to have escaped injury.

On the other hand, there were individual differences: In

Case 2, the *Mt* has not yet been seen, but from the history of suppuration it is, I think, fair to assume a rupture of the *Mt*, followed by middle-ear suppuration. There was splintering of the bone, with a fragment making its way outward, and in a measure obstructing the canal. In Case 3, there was undoubtedly rupture of the *Mt*, followed by a short period of suppuration, with considerable loss of substance, and the handle of the hammer was left adherent to the promontory. In Case 4, in addition to the facial paralysis, there was probably a rupture in the region of Shrapnell's membrane, which quickly healed; ground for this belief being furnished by the presence of dried blood still adhering to the canal wall, and only in this region. Why, in three months, this should not, in accordance with the well-known rate of growth outward of the skin lining the external canal, have been more than a quarter inch away from the membrane, is not clear to me, unless the paralysis of the facial nerve had interfered with the normal nutrition of the parts.

I believe that in all three cases there has been a fracture of the temporal bone. In looking over the literature of the subject among the German and American writers, in works upon the ear, as well as upon general surgery, the most clean-cut exposition of the subject is that given by Dr. Buck (*Manual of Diseases of the Ear*, p. 291, and *International Encyclopædia*, vol. v., p. 348). The following quotation is from the *Manual* "Fractures of the temporal bone may be subdivided into two classes: 1. Fracture or diastasis of the tympanic or squamous portion, in the region of the middle ear, without implication of the pars petrosa. 2. Fracture of both the tympanic and the petrous portions. Both are produced by *contre-coup*. In the first variety, the line or lines of fracture correspond with the lines of union of the three bony portions which together form the temporal bone, and which in fœtal life represent separate centres of growth, viz.: the squamous portion, the tympanic portion, and the petrous portion. These fractures, therefore, partake somewhat of the nature of diastases. In the second variety, the fracture of the petrous portion of

the temporal bone represents a genuine fracture. . . . In cases of fracture of the temporal bone, a hemorrhage from the ear means, as a rule, a rupture of the blood-vessels in the vicinity of Shrapnell's membrane. Such a hemorrhage may be copious, and may continue for a comparatively long time; and the mere fact of its copiousness does not indicate that a communication has been opened between the cavity of the tympanum and any of the large vascular channels which surround the temporal bone. . . . I am also satisfied, from examinations which I have made in cases of injury to the head of recent occurrence, that fractures of the temporal bone often occur without the slightest bleeding from the external auditory canal." Upon this point Dr. Buck differs from most writers on this subject, who, in speaking of hemorrhage from the ear as a diagnostic sign of fractured base, say that, to be of any value as a means of diagnosis, it must be of a serious nature, and, above all, it must continue for some time.

Buck (*loc. cit.*, page 294), says: "If we consider for a moment the solid, masonry-like construction of the temporal bone, we can scarcely resist the conclusion that, when a blow upon the top, back, or opposite side of the head is followed by any decided symptom whatever in the ear (as, for instance, bleeding, a watery discharge, or even simply pain), a fracture or a diastasis must have taken place in the corresponding temporal bone. A mere jar of the head is not competent to produce a hemorrhage from the external auditory canal. On the other hand, an actual stretching of the soft parts to such a degree as to tear one or more blood-vessels, is not, under such circumstances, physically possible in the vicinity of the drum-membrane unless at the same time there shall have been an actual giving way of some part of the surrounding arch of bone."

Hemorrhage from the nose and mouth, in cases similar to the above, seems to be very little spoken of. Nancrede, in his article on "Injuries of the Head" (*Intern. Encycl. of Surgery*, vol. v., p. 34), says: "Epistaxis can only be of any diagnostic value when persistent, and when accompanying symptoms of grave cerebral concussion. . . . Pharyngeal

hemorrhage, or vomiting of blood, is of much less value than either orbital or aural hemorrhage. . . . Bleeding from the pharynx, or vomiting of blood, may proceed, not from fracture of the vault of the pharynx, or roof of the nose, but from a fracture of the petrous bone without rupture of the membrana tympani, so that blood entering the tympanic cavity escapes into the pharynx by the Eustachian tube. . . . Indeed this sometimes may occur even with a ruptured membrana tympani. The possibility of this double hemorrhage arising from a fracture of the petrous bone alone, and not from one of the bones forming the roof of the nose or naso-pharynx, must not be forgotten in making the diagnosis, lest greater cranial injury be supposed to exist than in reality has occurred." In each of the three cases reported above there was bleeding from the nose and mouth. Of the origin of this I do not feel sure. That there was a fracture anywhere except in the immediate vicinity of the tympanic cavity I do not believe. Hence, and because the hemorrhage was slight, I am inclined to the opinion that some of the blood from the tympanic cavity found its way through the Eustachian tube, and thence outward through the nose and mouth.

As an aid in locating a fracture of the temporal bone, where there is facial paralysis, Nancrede (*loc. cit.*) says: "Owing to the connection of the facial with the sphenopalatine ganglion, it depends on the part of the portio dura injured, whether the uvula and soft palate will be paralyzed as well as the facial muscles, or not. In the former event, the line of fracture must be across the internal auditory meatus, so as to injure or compress the nerve before it gives off the greater petrosal nerve—that is, between the brain and geniculate ganglion, which is situated in the first part of the aquæductus Fallopii. If the uvula and palate be unaffected, the line of fracture must traverse the petrous bone so as to injure the facial nerve as it passes in the Fallopian canal across the internal wall of the tympanum." This aids in locating the fracture in Case 4, since there was no paralysis of the uvula or soft palate. It was in this case also in which the dizziness was by far the most severe and most

prolonged. From the proximity of the Fallopian canal, as it crosses the inner wall of the tympanic cavity, to the semi-circular canals, I think it may safely be held that one or more of the latter were involved, and hence resulted the great and long-continued dizziness.

Treatment: An interesting point relative to the use of pilocarpin was accidentally raised in Case 1. Owing to circumstances, the drug was necessarily ordered to be taken by the mouth, instead of being given hypodermically in $\frac{1}{8}$ grain doses t. i. d. By mistake the patient took in the first twenty-four hours a grain of pilocarpin muriat., and showed the full constitutional effect of the drug. A day later than this was noted the only positive gain in hearing noticed while he was under treatment. Whether it was a case of *propter hoc* or only *post hoc*, I am not prepared to say.

In Case 3, the following considerations led me to at once recommend the removal of the ossicles to improve the hearing. First of all, the patient had lost the hearing in this, the only ear that had ever been useful to him; the tuning-fork showed the presence of a good internal ear; the more ordinary methods of treatment had been tried with little or no benefit; my previous experience had led me not to expect any great permanent benefit from simply severing the adhesions of the malleus to the promontory. The day following the operation the hearing had improved from 3" for loudly spoken words to 6" for conversational tones. He then lost part of this gain from subsequent inflammatory swelling, but is now improving again, his hearing being on March 1st 6"-8" for conversational tones. Patient is still under treatment, and I anticipate still further gain in hearing.¹

In Case 4, the treatment consisted of inflation and counter-irritation, and the hearing distance has steadily increased from 2" for a whisper, up to the present time (March 4th) when it is 12 feet.

In conclusion it seems to me :

¹ NOTE.—July 1st. This anticipation has not been realized, the hearing having remained at 6"-8" for conversational tones.

I. That the division made by Dr. Buck of fractures of the temporal bone into 1. "Fracture or disastasis of the tympanic or squamous portion, in the region of the middle ear, without implication of the pars petrosa. 2. Fracture of both the tympanic and the petrous portions," is an entirely tenable, and eminently practical, one.

II. That fractures of the temporal bone, without fatal consequences, and even without loss of hearing, occur more frequently than is generally believed.

III. That in all cases of suspected fracture of this part of the skull, a thorough examination (by speculum and reflected light) should be made of the external auditory canal, of the membrana tympani, and, so far as possible, of the tympanic cavity, as an aid to diagnosis and prognosis, and to obtain any indications that may exist for treatment.

NOTE ON THE OPERATION FOR RE-FORMING THE AUDITORY MEATUS.

BY H. GIFFORD, M.D., OMAHA, NEB.

ONE so seldom has the opportunity of operating for the restoration of the auditory meatus that I think it worth while to describe a method, new, as far as I know, after having tried it but once.

In 1891, I treated a patient with lupus of the left auricle and the adjacent tissues, whose full history I hope to give at some future time, when the case shall have reached a definite termination. The auditory canal was so filled up by cicatricial tissue that the patient, for months before coming to me, had maintained an opening for the exit of the slight purulent discharge from the middle ear only by keeping a small quill constantly pressed down into what was left of the meatus. Under chloroform, the cicatricial tissue and granulations which filled the meatus down to the remnants of the drumhead were cut out, together with a large tuberculous nodule extending deep into the tissues at the junction of the pinna with the cheek above. The canal was then thoroughly scraped with a sharp spoon, and after having been cleaned with peroxide of hydrogen it was plastered throughout with thin Thiersch flaps taken from the forearm. Aristol was then filled in around a small glass tube which reached nearly to the middle ear, and a moist dressing was applied and left for two days, after which it was changed daily for a week. The flaps healed in perfectly, and for several weeks the man had a well formed meatus lined with healthy epithelium, and there is no rea-

son to suppose that this would have undergone any change if the operation had been done for any less malignant affection.

Unfortunately, however, the disease was not eradicated. An injection of tuberculin led to the discovery of a tuberculous deposit in the mastoid cells, the eradication of which demanded the destruction of the greater part of the recently formed meatus. Nevertheless, the excellence of the result, so long as it was allowed to last, and the confidence which an extensive use of Thiersch flaps in other operations has given me, in the stability of the results obtained by them, encourage me to recommend their use to any who may be called upon to re-form or newly form an auditory meatus.

I ought to state that in my case the application of the flaps was especially easy on account of a large part of the centre of the pinna having been destroyed, and this suggests the idea that in performing the operation on an ear with a normal pinna, it might be advisable to partially detach the latter if, otherwise, it were found difficult to adjust the flaps accurately.

TWO CASES OF BEZOLD'S PERFORATION OF THE MASTOID ANTRUM.

BY PROF. GUYE, AMSTERDAM.

Translated by Dr. WARD A. HOLDEN.

BEZOLD, now professor of otology in Munich, described, in the year 1881, a new manner of extension of purulent inflammation from the tympanic and neighboring cavities.¹

This consists in an abscess deep in the mastoid process, perforating on the medial side. The pus does not reach the surface, being prevented by the various muscular attachments on the outer surface and tip of the mastoid process.

Following the perforation there is swelling of the retro-maxillary fossa, which is easily mistaken for a simple swelling of the soft parts, lymphatic glands, etc., and later pus burrows in various directions between the deep fasciæ of the neck, often passing backward forming retro-pharyngeal abscesses—rapid processes which if not rightly understood and treated, will lead in all probability to a lethal ending.

Bezold produced this peculiar process artificially in the dead subject, by opening the mastoid process externally, then perforating the medial wall with a gouge and injecting thick colored solutions which spread in the same manner as the pus. He suggested the same process as an operative procedure, which in one case at least was successful.

These cases, judging from the reports in otological literature in the ten years since Bezold published his paper, are not frequent. I have found only the following reports.

¹ *Deutsche med. Wochenschr.*, No. 28, 1881.

Moos,¹ in a paper before the association of South German aurists in Freiburg, at Easter, 1889, described four cases that he had observed, three of which resulted fatally and one favorably.

Kiesselbach at the meeting of the same association May 25, 1890,² presented a patient in whom a Bezold process had been complicated with a retro-pharyngeal abscess, and the local affection was gradually cured, but an apex catarrh and tuberculosis of the lungs had developed.

Gorham Bacon,³ among a number of cases of abscess of the antrum, described one of Bezold's disease which resulted favorably.

Politzer in his text-book⁴ alludes to Bezold's observations and says that both Burckhardt-Merian and he had each treated one such case.

Hartmann, in the fourth edition of his text-book, 1889 (p. 202), states that he has opened the antrum thirty times in acute inflammation of the middle ear, and of these four showed a perforation of the medial wall of the mastoid process. Two of these cases were described in detail by Dr. Cholewa,⁵ his assistant at that time.

Hartmann has seen several cases since, and does not consider them so rare as the few reports in literature would lead one to believe.

Kirchner mentions such cases in the third edition of his text-book (p. 152, 1890). In a case that he observed, the pus spread along the fascia of the digastric muscle and formed a hard tumor under the chin.

As the case histories are not numerous, I shall give two in full.

CASE 1.—Abscess in the mastoid antrum, with perforation through the medial wall of the process, and also into the external canal, with facial paralysis; cured.

Oct. 17, 1887.—I saw for the first time Mr. B., æt. fifty, in

¹ *Zeitschr. f. Ohrenheilk.*, p. 47, 1890.

² *Zeitschr. f. Ohrenheilk.*, p. 114, 1891.

³ *ARCH. OF OTOL.*, xviii., p. 301, Case 16; *Zeitschr. f. Ohrenheilk.*, xxii., p. 63, 1891.

⁴ Pp. 634 and 650.

⁵ *Deutsche med. Wochens.*, No. 49, 1888.

consultation with Dr. Groeneboom. The patient, previously healthy, had pain in the ear eleven weeks before, and soon after otorrhœa with tenderness of the mastoid process. A Wilde's incision was made twice, no pus being found, but a temporary improvement following each incision. Gradually there developed in the neck and the retro-maxillary fossa a hard tender swelling, which showed no fluctuation, and which was regarded as being due to the swelling of a lymphatic gland and œdematous infiltration. There was violent pain in the ear, which allowed the patient no rest day or night, and since the previous day there is complete facial paralysis. I found perforation of the membrana tympani, granulations in the external canal, chronic nasopharyngeal catarrh. Politzerization gave no result, with the catheter a perforation sound. I washed out the tympanic cavity through the catheter and treated the patient in the ordinary manner.

Nov. 8th.—Three weeks later I saw the patient again. He was at first somewhat improved, but the condition was then less favorable. I found at that time a round polypoid granulation, proceeding from a fistula in the posterior wall of the canal. I cut off the granulation with a ring-shaped knife, and saw that pus exuded from the fistula, more abundantly when the hard swelling below the mastoid was pressed upon. This condition was inexplicable to me at the time, and only on seeing the case again was I reminded of Bezold's case, and I saw that there had been a double spontaneous perforation of the antrum, one passing into the external canal, and one through the medial wall of the process, and that by pressure on the abscess the pus was forced back into the antrum through one opening, escaping then from the other. I wrote my opinion to the attending surgeons, and stated that I thought that with the employment of moist heat, a point would show in a few days where the opening was to be made. Dr. Groeneboom confirmed my opinion, and eleven days later I found a fluctuating spot at the anterior margin of the sterno-cleido-mastoid muscle, and from an opening made here a quantity of pus escaped. I passed into the opening a rubber tube without lateral perforations, and water injected into this came freely from the ear. This tube was left in as a drainage-tube, and the injections were repeated daily, while the ordinary treatment, Politzerization, etc., was continued. I did not see the patient again before his recovery. After two weeks of this treat-

ment, there was a complete *restitutio ad integrum*. Six months later I saw the patient, who was entirely cured.

CASE 2.—Chronic Ozæna. Otorrhœa of Short Duration. Spontaneous Perforation through the Medial Surface of the Mastoid Process. Obstinate Headache. Chiselling of the Antrum. Retro-pharyngeal Abscess. Operation. Cure.

Mr. H., æt. sixty-five, came under my care in January, 1891. He had had for five or six years a chronic nasal catarrh with hypertrophy of the mucous membrane, formation of crusts, fetor, and anosmia, which had been treated with injections, when suddenly he had a tingling in the left ear without pain, and on the following day an otorrhœa. The otorrhœa ceased after some days' treatment, but tenderness of the mastoid and the left half of the head continued. In October of the same year a mastoid operation was proposed, but the patient would not consent, and put himself under the care of an ignorant *masseur* who promised him a cure without operation, massaged him four months with the result that the headache grew steadily worse, and a hard swelling gradually developed at the lower border of the cranium. I saw the patient January 27th. At that time there was no otorrhœa, the posterior wall of the canal was bulging, the mastoid not sensitive, but a severe headache over the entire left half of the head with nightly exacerbations, a hard sensitive swelling along the lower margin of the skull, and chronic naso-pharyngeal catarrh with crusts and fetor. The patient refused an operation.

The hearing was : L = 0, R, good. The nose, pharynx, and ear were treated in the usual manner. As this caused no marked improvement an operation was decided upon, although there was no absolute certainty of the presence of pus in the antrum.

Feb. 7th.—The antrum was opened with a chisel. After passing through a dense layer of bone the antrum was reached and pus evacuated. The cavity of the antrum was large, and a drainage-tube was left in the wound. Two weeks later there was more swelling below and behind the mastoid and the fluctuating tumor spread to the back of the neck. When this tumor was pressed upon pus exuded from the fistula in a stream. There was, however, nowhere a superficial fluctuation which would serve as an indication for an incision.

March 10th.—On the advice of a colleague who thought that there was pus beneath the periosteum, I made a long deep incision

through the periosteum from the fistula downward and backward to the margin of the process. There was no pus beneath the periosteum.

March 15th.—The tumor had almost disappeared, and pressure at the lower margin of the cranium forced no pus out of the fistula. From this we concluded that the pus had been gradually absorbed and that the abscess cavity would close, when four days later we were disabused of this idea in a most unpleasant manner.

March 16th.—Some pus exuded on pressure, on the 17th none, on the 18th a little, on the 19th none, but the patient complained of difficulty in swallowing. When the pharynx was examined, a large retro-pharyngeal abscess was found, which occupied the entire left half of the pharynx and clearly showed fluctuation. This abscess was opened with a knife, and a quantity of pus evacuated. Each day it was reopened and washed out. Four days later there was again a marked swelling deeper in the pharynx and the patient could not swallow. Two new abscesses were opened with the knife, and all were kept empty by pressure with the finger.

At first, massage of the neck forced some pus into the throat, but this soon ceased, and the infiltration of the pharynx disappeared, and the general condition improved.

May 6th.—The patient came to my office. There was no headache.

May 20th.—The tube was removed and the wound soon healed. The giddiness gradually passed off. There remained only some sensitiveness of the deep cicatrix over the antrum, which would disappear at each catheterization and return on the following day. For this I made a paracentesis June 20th, through which air passed freely on Politzerization. On the following day the wound was healed, the air passed freely into the tympanic cavity, but there was no perforation sound. This day for the first time there was no giddiness, and the cicatrix did not become tender again.

Now, Dec. 31st, the patient is well, the left ear is deaf, the right ear hears a whisper at 4 m, ordinary speech at 9 m; with the right ear closed, whisper heard at 0.20 m., ordinary speech at 0.30 m, no better with the left ear open than with it closed. He has no tinnitus, no headache, has gained ten pounds in weight, and the naso-pharyngeal catarrh is so much better that the smell, which has been almost completely lost for years, has returned in a measure.

I have little to add in explanation of the course of the disease in these two cases; *mutatis mutandis*, they agree with Bezold's description. I would say a few words, however, in regard to treatment. I have not followed Bezold's plan of opening the process deeply and then breaking through the medial wall and placing a drainage tube in this cavity. With the great swelling of the soft parts, this seems to me a rather formidable operation, which perhaps when the perforation is recent and the pus has not burrowed far downward and backward in the neck, may be indicated. When the latter is the case, however, I scarcely believe that by this operation we can cause the pus in sufficient quantity to take a direction against the influence of gravity. The results in such cases so treated are not satisfactory. I believe that it would be better after the antrum had been sufficiently opened, to wait for an indication for making a counter opening. Where, as in my first case, the pus points, this is the most favorable spot for making the incision. When such is not the case, and the pus sinks down, forming a retro-pharyngeal abscess, there is still hope that, if opened at the right time and further sinking prevented, which may be often difficult, there may still be a *restitutio ad integrum*, as is shown in my second case.

It is manifest that the best course for the surgeon to pursue is to form as accurate an opinion as possible regarding the anatomical features in the course of the disease, and rather than always perform a fixed typical operation, to observe and individualize the case, and to assist nature at the right moment, which, although it has its own *vis medicatrix*, does not individualize, and in this way to follow Bacon's saying: *Non fingendum aut excogitandum, sed videndum quid natura faciat ac ferat.*

REPORT ON THE PROGRESS OF OTOLOGY DURING THE SECOND HALF OF THE YEAR 1891.

BY PROF. A. BARTH AND A. HARTMANN.

Translated by Dr. MAX TOEPLITZ, NEW YORK.

A.—NORMAL AND PATHOLOGICAL ANATOMY, HISTOLOGY,
AND PHYSIOLOGY OF THE HEARING ORGAN AND OF
THE NASO-PHARYNGEAL CAVITY.

BY AD. BARTH, MARBURG.

I.—ANATOMY.

a.—HEARING ORGAN.

1. Prof. G. SCHWALBE. Contributions to the anthropology of the ear, with one plate. "International Contributions to Scientific Medicine." Paper dedicated to RUDOLF VIRCHOW in celebration of the completion of his seventieth year of age. Vol. i.

2. HAUG, Munich. Contributions to the microscopical anatomy of the tumors of the external ear, with one plate. *Arch. f. Ohrenheilk.*, vol. xxxii, p. 151.

3. MAGGIORA, A., and GRADENIGO, G. Bacteriological observations upon furuncle of the external auditory meatus. (Observations bacteriologiques sur les furoncles du conduit auditif externe.) *Annales de l'Institut Pasteur*.

4. MAGGIORA, A., and GRADENIGO, G. Contribution to the etiology of the catarrhal inflammation of the ear. *Centralblatt für Bacteriologie und Parasitenkunde*, etc., 1891, No. 19.

5. KOELLIKER. Divisions of the cochlear nerve. *Verhandlungen d. anat. Ges. auf d. V. Vers.*, Munich, 1891.

6. Prof. Dr. HABERMANN, Graz. Nervous atrophy in the inner ear. Second communication. *Zeitschr. f. Heilkunde*, vol. xii., 1891.

7. Prof. Uj. HEIBERG. Thrombophlebitis sinus transversi in suppurations of the ear. From the paper published in honor of Dr. DANIELSEN, Bergen.

1. SCHWALBE has made anthropological measurements of the auricles in 211 individuals (109 men and 102 women), and observed the frequent occurrence of Darwin's pointed ear. Its greater frequency in the male is quite remarkable. The point is present in more than three quarters of all men and in nearly 75 per cent. of all ears, whilst among females hardly one half of the individuals and only one third of the ears present Darwin's point. It is, therefore, remarkable that in females the more primordial form is not present, as *e. g.* in the development of the genital organs, but the derivative form. The shortening is much more marked in the female. In addition the left ear in both series is on the average much shorter than the right. Schwalbe then gives sixteen measurements determining different indices, as in the measurements of the skull.

2. HAUG describes 12 cases of tumor of the external ear:

1. Perivascular fibroma at the lobulus, without cicatrix, the centre of which consists of fully developed, the periphery of young, connective tissue.
2. Fibroma without connection with the cicatrix, due to piercing the ear, with hyaline degeneration of the basement substance.
3. Cicatricial keloid of the lobule, due to puncture, in the superficial layers exhibiting the character of a cellular, firm fibroma (fibro-sarcoma), in the deeper that of cylindromatous keloid in the state of hyaline degeneration.
4. Chronic inflammatory, perivascular infiltration, probably consecutive to congelation of the ear lobe, partly with new formation of connective tissue, partly with separation of the tissue fasciculi by cedematous swelling in the reticular as well as in the deeper cutis layers.
5. Peculiar combination of angioma and tuberculosis of the ear lobule.
6. Soft fibroma from the cartilaginous meatus externus.
7. Lymphangioma terminating in fibrous degeneration, from the region of the tragus.
8. Chondromyxoma from the posterior surface of the auricle, probably of traumatic origin.
- 9, 10, 11, and 12. Four cases of carcinoma of the auricle. Haug, as a result of examination of a large number of carcinomata of the skin, especially of the four mentioned above, has arrived at the

conclusion that a great proportion of carcinomata of the skin originate from the interpapillary cones of the rete and that the lowest layer only of the cylindrical basal cells forms the proliferating epithelial stratum proper. Haug thinks himself justified in denying especially for the ear the development of carcinoma from the deeper layers.

3. MAGGIORA and GRADENIGO found in most cases of furunculosis of the external meatus the staphylococcus pyogenes aureus, then less frequently the albus and citreus. In two cases citreus and albus were found combined, in one case staphylococcus albus and bacillus pyocyaneus. The latter is described in full.

4. Among sixteen of twenty cases the presence of pathogenic micro-organisms was demonstrated in the secretions of the naso-pharyngeal cavity and of the middle ear, viz., the staphylococcus aureus and albus were invariably found. From the cases examined we conclude that pathogenic micro-organisms must be present also in those affections in which they cannot be bacteriologically demonstrated without further investigations. Suppurative and catarrhal inflammations are due to the same micro-organisms. Mechanical or chemical irritation may produce a new inflammation, and also increase an old one.

5. KOELLIKER demonstrated a specimen with reference to the divisions of the fibres of the cochlear nerve. These are found in the ganglion laterale acustici, and seem to occur in all fibres of the cochlear nerve. Similar divisions, which resemble those of the sensory roots of the spinal nerves, are found also in the vestibular nerve. The specimen was that of a new-born cat, prepared according to Golgi's method.

6. HABERMANN continues his publications from vol. x. of *die Zeitsch. f. H.* III. and IV. follow as a description of the petrous bones of a woman, aged sixty-two. The condition is on both sides approximately the same. Fibrous atresia of the external auditory meatus and sclerosis (chronic inflammation) of the tympanic mucous membrane with formation of cysts. Atrophy of the nerves in the basal cochlear turn. Small hemorrhages in the mucous membrane of the tympanum and in the cochlea. In the latter fat embolisms (fatty degeneration). V. Fibrous thickening of the mucous membrane of the tube and membrana tympani, dislocation of the stapedial plate, degeneration of Corti's organ at the extremity of the basal cochlear turn, with atrophy of its nerves and ganglia. Fibroma in the trunk of the acoustic nerve (inner auditory meatus). VI. Cholesteatoma of the external audi-

tory meatus. Sclerosis of the middle ear with numerous cysts. Atrophy of the nerves in the lamina spiralis, and of the ganglionic cells in Rosenthal's canal. VII. Slightly pigmented cicatrix in membrana tympani. New formation of connective tissue in the middle ear. Atrophy of the cochlear nerves. VIII. Perforations of the membrana tympani. Sclerosis of the mucous membrane of the middle ear, with formation of cysts and occlusion of both fenestral recesses by connective tissue consecutive to purulent inflammation of the middle ear and labyrinth. Atrophy of the cochlear nerve. IX. and X. Purulent middle otitis which has run its course, and otitis with recovery around the stapedial base, ankylosis of the stapes, atrophy of the nerve, hemorrhages subsequent to cholæmia. In conclusion Habermann deems it quite probable that the inflammatory process of the middle ear does not at first act through the bone upon the vestibule, but through the round window upon the lower cochlear turn. The atrophy of the nerve was in all cases principally quantitative, the number of nerve fibres being decreased as well as the ganglionic cells in Rosenthal's canal. It follows from the investigations that alterations in the nervous apparatus of the inner ear are of frequent occurrence, particularly also as a result of suppuration of the middle ear.

7. HEIBERG briefly reports eight cases of sinus thrombosis with autopsies. In one half of the cases the wall between the mastoid cells and the sigmoid fossa was found to be carious, in the other half to be intact. In six cases metastatic foci, usually gangrenous and offensive, were found in the lung. In two cases the pus was bacteriologically examined, and diplococci and bacilli were demonstrated. The thrombosis involved in three cases the vena jugularis interna, in one case the sinus petrosus superior and inferior, the cavernous sinus, and the vena ophthalmica. In the latter case considerable œdema of the face, and especially of the eyelids, was present. The diagnosis was not made *intra vitam* (the first three cases had occurred in the year 1871). In three cases the mastoid process was trephined. The histories and the anatomical description of the cases are not fully enough described to claim widespread interest.

UCHERMANN.

b.—NASO-PHARYNGEAL CAVITY.

1. SUCHANNEK, Zurich. Contributions to the normal and pathological histology of the nasal mucous membrane. *Anat. Anzeiger*, 1882, p. 55.

2. HASKE, TH. A new method of exposing the naso-pharyngeal cavity with its pneumatic appendices without disfiguring the cadaver. *Virchow's Archiv*, vol. cxxv., No. 2, 1891.

3. STÖHR, PH. The development of the adenoid tissue, the lingual follicles, and the tonsils in man. Paper commemorative of the fiftieth anniversary of VON NÄGELI'S and VON KOELLIKER'S graduation in medicine, dedicated by the university, etc., of Zurich, 1891. *Anatom. Anzeiger*, 1891, p. 545.

1. SUCHANNEK frequently found in the respiratory as well as in the olfactory region of man eosinophilous, puffy glandular cells, the physiological or pathological importance of which cannot up to date be determined. In two of many cases the presence of pigmented glands (in the olfactory region) which, he considers as an early appearance of old age, could be proven. In persistent rhinitides masses of secretion are frequently found in the lumen of the gland-ducts, as also frequently cellular masses adhering in lumps, which originated from glandular epithelium. This picture distinguishes chronic rhinitis from the acute form, in which the cells are separated from their connection and fall into the lumen of the tubulus. Wherever ciliated epithelium is injured, metaplastic changes take place. These can be studied in chronic rhinitides, especially in all stages of ozæna. As in the olfactory region, the metaphasia frequently begins in the respiratory region in the deepest epithelial layers, whereupon the surface loses the ciliated hairs, and flattening of epithelium sets in.

2. After removal of the brain, the skin of the skull is dissected off so as to lay bare the arches of the orbit, the nasal bones and the foramen occipitale; then the connection of the muscles of the nape of the neck with the skull is severed. A sagittal section is made with the saw, either to the right or left of the median line as may be necessary, about 0.3 cm from it, anteriorly through the nasal bones, posteriorly through the foramen occipitale, whereby the base of the skull is wellnigh entirely sawn through, except some bony bridges and the dental process of the second vertebra, which are now separated by the pointed saw. The nasal bones, the hard palate, the dental process of the superior maxilla can be pulled apart, permitting the dissection of non-dissected linings of mucous membrane of the nasal and naso-pharyngeal vault with the knife. On further pulling apart, the above-mentioned bone connections break without difficulty and without destruction of important parts, and the two halves of the

skull rotate around each axis, placed through the maxillar and atlas joints and open like a book. In most cases the nasal cavity of the side opened first can be well inspected, and after removal of the septum, that of the other side. If this is not the case, the base of the skull is cut through vertically to the sagittal section, to the right and left of the point where the upper wall of the naso-pharyngeal cavity passed into the posterior, until the lateral wall of the naso-pharynx is reached on either side. Furthermore, from the point where the sagittal section cuts the sella turcica, a section is made to the ends of the line described above, so as to cut a rectangular triangle out of each side of the base of the skull. The sphenoid as well as the nasal cavities are thus widely exposed. The infundibulum, septum, and antrum of Highmore, frontal sinuses, and ethmoidal cells can now be readily opened.

The removal of the organ of hearing, according to Schalle or Politzer, can be added to this method. This method has the advantage of taking but little time, of requiring no assistants, no complicated array of instruments, no involved technique or extensive knowledge of anatomy. It fully preserves the turbinated bodies and infundibulum, which are always destroyed by Schalle's method. Schalle's method has the advantages of including the hearing organs, of preserving the natural picture of the naso-pharynx and *aditus ad laryngem*, and of removing the specimen *in toto* so as to facilitate its preservation.

MAX TOEPLITZ.

3. Adenoid tissue is formed by mesenchyma, which is transformed into reticular connective tissue, and by derivatives of the circulatory system, viz., the leucocytes. In the further development new leucocytes are added in part from the blood-vessels and partly by division of those emigrated before. The migratory cells only, derived from connective-tissue cells, play an important part in the formation of new reticular tissue. The *human tonsil* develops from a sulcus situated between the second and third pharyngeal arches, which is lined by a continuation of the oral mucous membrane. Striated epithelium and young connective tissue are here found, but no free leucocytes. Proliferations of epithelium then arise where the system of fissures is developed. From about the third foetal month until after birth leucocytes emigrate from the blood-vessels, and transform the young fibrillary connective tissue into adenoid tissue. The free leucocytes act probably as agents in the processes of absorption.

II.—PHYSIOLOGY AND PHYSICS.

a.—HEARING ORGAN.

1. LORENZ, C. Investigations upon the perception of differences of sound. *Philosoph. Studien*, vol. v., p. 26.

2. BING, ALBERT. A new experiment with the tuning-fork. *Wien. med. Blätter*, 1891, No. 41.

3. VERWORN, MAX. Equilibrium and otolithic organ. Paper written on assuming lectureship—Jena. Bonn, 1891.

1. The author, writing under Wundt's supervision, arrives at the following conclusions: 1. We have the faculty of comparing with each other finite differences of sound dependent upon affinity of timbre, and of measuring them. 2. The differences of sound sensations are almost entirely proportionate to the number of vibrations (pitch).

The method of the imperceptible differences may be applied to the sensations of sound and is not limited to the comparison of intensities of light, as has heretofore been almost generally assumed.

2. BING describes a new experiment with the tuning-fork, placing, as in Rinne's experiment, the tuning-fork upon the mastoid process and occluding the external meatus after the sound is no longer perceived. The sound will reappear under normal conditions. This physiological fact is made use of in the well-known methods employed for examination of hearing.

3. VERWORN examined the ænophores, and ascertained above all their position of equilibrium after removal of the otolith. The position of equilibrium was lost and the movements of the animal became irregular. The otoliths, having nothing to do with the function of hearing (which seems to be absent in these animals), are called statoliths by the author.

b.—NASO-PHARYNGEAL CAVITY.

1. ZWAARDEMAKER, H. Formula for the acuteness of smell. (Norme de l'acuité olfactive [olfactie].) *Cz. Arch. Neerlandaises*, vol. xxv., p. 131.

2. GUILLAND G. LOVELL, M.D., F.R.C.P. Ed. On the function of the tonsils. Read before the Medico-Chirurgical Society of Edinburgh, July 8, 1891.

1. ZWAARDEMAKER uses a cylinder filled with odorous substances to determine the normal acuteness of smell (olfactia), and its impairment is expressed in fractions of the normal, as in examination of the acuteness of vision or of audition. The greatest fault of the entire method consists in the fact, that the measuring instrument is not constant and that an especial examination must be made for each smelling substance.

2. The tonsils—viz., the palatine, lingual, and pharyngeal tonsils—are organs for the production of leucocytes. They increase principally by mitotic division. The newly formed leucocytes are partly retained in the lymph vessels, thus remaining partly in the tonsils as “stationary” cells, or in part emigrate upon the surface, passing through the epithelium. They intercept here foreign bodies, especially micro-organisms which would otherwise penetrate the tonsils. The lingual and palatine tonsils, and the diffuse infiltration with leucocytes upon the lower surface of the soft palate, form a protective wall between the mouth, which is flooded with micro-organisms, and the remaining digestive apparatus, the pharyngeal tonsil and the upper surface of the palate forming the protective ring for the respiratory tract. The continuous production of leucocytes is sufficient to maintain a current leading outward and to prevent the penetration of foreign bodies. Under certain conditions, as, *e. g.*, in general debility, this current may be interrupted, as also the formation of leucocytes. The pathogenic organisms are thus enabled to enter the tonsils and to cause local or general infectious processes.

B.—PATHOLOGY AND THERAPEUTICS OF THE HEARING ORGAN AND OF THE NOSE.

By A. HARTMANN, BERLIN.

a.—GENERAL LITERATURE.

1. Prof. E. BEZOLD, Munich. Statistical report on the ear patients treated from the year 1887 to 1889 inclusive. *Arch. of Ohrenheilk.*, vol. xxxii., p. 113.

2. PANSE. Report of work done at the aural clinic of the Royal University of Halle from April 1, 1890, to March 31, 1891. *Ibid.*, p. 38.

3. MARIAN. Report on ear cases treated from 1887-1890. *Ibid.*, p. 161.

4. GELLÉ. Aural clinic annexed to the hospital of the Salpêtrière (service of Prof. CHARCOT). Statistics of 1890. *Progress Médicale*, 1891.

5. COHN, MICHAEL. Nystagmus in aural affections. *Berl. klin. Wochenschr.*, 1891, No. 43.

6. HESSLER, Halle. Aural affections after simple operations in the nose. *Münch. med. Wochenschr.*, 1891, No. 50.

7. WÜRDEMAN, H. V. Acute suppuration in the middle ear and facial paralysis following the use of Eustachian bougies. *Ophthalmic Record*, December, 1891.

8. TIBBETS, L. A remarkable case of gunshot wound of each ear with recovery. *Medical Record*, November 7, 1891.

1. BEZOLD'S report is the seventh of his triennial reports; 4,473 patients with 4,867 affections were examined. From the abundance of experience, to which justice cannot be done in a brief review, we emphasize the fact, that Bezold because of exact application of his principles of examination has found a much more considerable number of pure or wellnigh purely nervous affections than in the former triennia, while the number of otitis media chronica without retraction of the membrana tympani decreased. Furthermore, Bezold gives a detailed explanation of the possibility, by exclusively functional examination, of defining or differentiating sharply those two forms of disease which, because of their meagre or completely negative result, have heretofore offered the greatest difficulty in diagnosis, viz., chronic sclerotic processes of the middle ear, and nervous deafness. Bezold observed 52 cases of otomycosis. In a case of congenital atresia of the external auditory meatus and of rudimentary auricle the rudimentary organ could be examined *post mortem*. A complete defect of the annulus tympanicus was found. This condition being found repeatedly with great regularity, Bezold considers the formation of an artificial meatus as of no avail. Bezold found in one case the very rare condition of petrification of old epidermal masses in the external meatus. The firm stony concretions were "enclosed in thick offensive scales of epidermis and showed completely the tubercular structure and appearance of sequestra of spongy bone substance." RUMLER (Berlin).

2. At the aural clinic at Halle 1,605 out-patients and 172 in-patients were treated. "Excision of the malleus through the external meatus was done 29 times, which in 14 cases was associated with extraction of the incus." PANSE advocates the operation through the external meatus and also the removal of the ossicles, "since, as a matter of principle, the removal of the carious malleus only must be considered as a half measure." The facial nerve was paralyzed by the operation in but one case during the year of the report. The result of chiselling of the mastoid process according to Stacke's method, viz., with horizontal separation of the membranous posterior wall of the external meatus, could be well judged from a specimen obtained by autopsy. The patient had died a month after the operation. The bone of the common cavity formed by external meatus and antrum was completely filled with young connective tissue, which extended into the various fissures of the spongiosa, and the epithelium of the external meatus had proliferated even into the remotest portions of the cavity, corresponding to the posterior wall of the antrum. In the further progress the entire cavity would thus have been lined by epidermis and the suppuration of the walls come to a standstill. In carcinoma of the external meatus Lysol was used at first in 2 per cent. solution, later in $\frac{1}{2}$ per cent., but the latter caused an intense burning sensation and did not remove the odor. Treatment, strictly carried out with tetraboracic acid had no favorable result; the affection was not essentially influenced, and unbearable burning was frequently produced. Opening of the antrum by operation was performed in 67 cases: in 27 with permanent, in 15 with temporary, result; in 3 without result, and in 3 with unknown result; 13 cases remained under treatment; 6 died, one patient who died having in addition carcinoma ossis petrosi. RÜMLER.

3. Eleven hundred and eighty-six patients were examined and treated by MARIAN. From his "clinical remarks" we emphasize the following points: Ten cases of "Rupture membr. tympani," 5 of which were in the right, 5 in the left ear. In six cases the injury was caused by a blow with the hand, and singularly in 3 cases upon the right ear. The nature and seat of the injury were characterized as follows: 1. "Oval perforation in front of the handle of the malleus." 2. "An oval opening runs from the handle of the malleus horizontally backward" (after $2\frac{1}{2}$ months, complete recovery). 3. "Rupture in the anterior superior quadrant in front of the handle of the malleus. In four

weeks, perforation somewhat reduced, hearing distance considerably improved." 4. "Blow upon the ear two months ago. Lacerated wound with indented margins in front of the umbo. Recovery with considerably diminished hearing distance." 5. "Seat of perforation in antero-inferior quadrant." 6. "Perforation in postero-superior quadrant." In one case there existed after a fall upon the right side of the head a flap-like laceration behind the handle of the malleus. Complete recovery with normal hearing-distance in a week. In two cases the injury was caused by piercing with a knitting-pin: in the first case "indented opening near the handle of the malleus;" in the second case, "small perforation in front of the handle of the malleus." In one case, injury following the piercing with a penholder; large perforation in front of the handle of the malleus.

RUMLER.

4. GELLÉ in this important paper discusses the different cases, which occurred at the clinic during the year 1890. The connection of the clinic with an institute for nervous diseases is of especial interest. The author then discusses the relations of deafness and disturbances of hearing to hysteria, neurasthenia, facial neuralgia and paralyses, vertigo, tabes, chorea, epilepsy, etc. His observations prove the difficulty of problems to be solved by the aurist, and the necessity of employing all methods of examination in making an exact diagnosis.

GELLÉ, Paris.

5. In the first case described by COHN, otitis media purulenta chronica, a vertiginous attack was induced by intensification of the aerial pressure, for which purpose pressure upon the tragus sufficed, with a tendency of falling toward the opposite side, and with, simultaneously, extreme horizontal nystagmus of both eyes. For the explanation of this phenomenon Cohn assumes an irritation of the labyrinth produced by the aerial pressure upon the labyrinth, which is hypersensitive because of the inflammation. In the second case fainting spells and rotatory nystagmus occurred during irrigation of the ear, affected by an old otitis media purulenta chronica. In the third and fourth case, the ear, with an extensive perforation of the drum-membrane, was syringed with *cold* water, whereupon intense vertigo and nystagmus took place.

RUMLER.

6. HESSLER observed during two years nine cases of this kind, one being in his own practice. The cases collected from literature of the subject amount also to nine. The difficulty of drawing inferences from these numbers as to the frequency of these

sequelæ is well-known to every aurist. *Reviewer, e. g.*, has observed during six months two severe cases of suppuration of the middle ear, following immediately after resection of the nasal septum in one case, and chiselling of a spina in another. Heßler warns against unnecessary operations, advocates the strictest possible antiseptis and the prevention of complications in the operated patients. Plugs ought not to remain *in situ* longer than twelve hours.

MÜLLER, Stuttgart.

7. WÜRDEMANN was treating a case of stricture of the Eustachian tube by bougie, when suddenly there developed an acute suppuration of the drum cavity associated with facial paralysis on that side. He thinks the infection came from the bougie, which had not been properly cleansed and made aseptic. Recovery from the inflammation and paralysis was complete.

SWAN M. BURNETT.

8. In TIBBET'S case, a man attempted suicide by shooting himself through the meatuses of both ears. The bullets were distinctly felt and efforts made to extract them but without avail. The finger could be passed two inches into either meatus. The wounds were kept clean, and after healing his hearing was sufficient to enable him to follow his occupation as a hackman.

SWAN M. BURNETT.

b.—INSTRUMENTS AND METHODS OF EXAMINATION.

9. BLOEBAUM, Coblenz. A celluloid ear speculum. *Monatsschr. f. Ohrenheilk.*, 1891, No. 9.

10. TURNBULL, LAWRENCE. Artificial drums. *Medical News*, August 1, 1891.

11. LUBET-BARBON. The palate hook and its application. (Du reveleur du voile et de son application.) *Arch. internat. de laryngol., de rhinol., et d'otologie*, 1891, No. 4.

12. VULPIUS. Remarks on the technique of the galvanocautery. Description of a new nasal burner. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 195.

13. BISHOP, S. S. Improved ear electrodes. *Four. Amer. Med. Assoc.*, October 31, 1891.

14. LAMANN, St. Petersburg. The incandescent lamps and the interpolation of resistance in the use of accumulators. *Monatsschr. f. Ohrenheilk.*, etc., 1891, No. 11.

15. BING, ALBERT, Vienna. A new experiment with the tuning-fork. Contribution to the differential diagnosis of the diseases of the mechanical conductive and of the nervous apparatus of hearing. *Med. Blätter*.

16. ZIEM, Dantzig. Palpation of the naso-pharyngeal cavity. (Du toucher de la cavité naso-pharyngienne.) *Arch. internat. de laryngol.*, etc., 1891, No. 6.

9. BLOEBAUM praises his specula made of celluloid as being very light, infrangible, good reflectors of light, and resistant to astringents. In using the galvano-cautery the danger of their taking fire must not be forgotten. (They are manufactured by B. B. Cassel, Frankfort-o-M.) KILLIAN.

10. TURNBULL has tested all forms and varieties of artificial drumheads and has found the simple ones of antiseptic gauze, wool, absorbent cotton, oil silk, or fine rubber the best. He finds that they rarely improve hearing materially. His experience with aristol as an antiseptic in ear diseases is not satisfactory. He finds iodoform preferable. SWAN M. BURNETT.

11. Unless patients are very easy to examine LUBET-BARBON thinks the use of the palate hook necessary for rhinoscopia posterior in order not to lose too much time or for the greater safety in operative procedures in the naso-pharynx. He recommends the hook devised by Moritz Schmidt. BOK, Berlin.

12. VULPIUS requires for the better utilization of the electro-motor power, the smallest possible resistances of conduction by using copper wires not too thin, and by placing a broad well-conducting contact at the handle. He used as burner a platinum wire, "which is less injurious to the adjoining parts by radiating heat and acts more rapidly and intensively than a flat burner." Vulpius describes his hot snare, which has proven very efficient during its application for several years." "A semi-circular platinum snare, about 2.5 cm long and 0.4 mm thick, connects two free limbs of copper wire (1.2 mm thick) or still better of silver wire, which are 11 cm long and converge to the handle. These limbs are covered with metal varnish, separated by a small ivory plate, cross each other at the angular curve used in nasal instruments and end in short and thick pieces, which connect them with the handle." RUMLER.

13. BISHOP uses as electrodes for the application of electricity to the ear two metallic cones covered with chamois fitted into the

meatus and held in place by an elastic band buckled around the head.

SWAN M. BURNETT.

14. LAMANN discusses the use of storage batteries for illumination, galvano-cautery, and faradisation. He emphasizes the fact that the incandescent lamps used for different purposes require different amounts of strength of current (ampères), electromotor power (volts) and interpolated resistance (ohms), in order to produce the best illuminating effect. This holds good also for apparently the same lamps. The electromotor power is increased and diminished by the number of interpolated accumulators. The strength of current is regulated by the rheostat which should be composed in incandescent lamps of spirals of genuine silver wire, on account of sufficient graduation of the resistances. For galvano-cautery instruments fewer accumulators (1 to 2 placed behind each other) are required and rheostats which permit of interpolating smaller resistances than those mentioned above, viz., those of copper wires, for the burners offer a considerably smaller resistance to the current than the lamps. The accumulator can also be used for the production of the primary current in induction apparatuses; it is, however, not of especial value, except in those apparatuses which are not composed of too thin a wire.

KILLIAN.

15. If a vibrating tuning-fork of medium size and pitch is placed upon the median line of the skull as in Weber's experiment, or, still better, as in Rinné's upon the mastoid process, the sound is perceived from the median line or in the corresponding ear respectively until it dies out. If then, while the tuning-fork is still kept upon the same place in contact with the bones of the head, and after the sound has disappeared, the operator places the finger in the external meatus, occluding it moderately, the sound reappears and is still perceived for some time. This renewed perception of the sound of the tuning-fork is called by BING secondary perception, in distinction from the former primary perception which has just died out. The return of the sound after occlusion of the external meatus is called the positive experiment, the result being negative if the sound of the tuning-fork does not reappear after occluding the meatus. The positive result is a normal phenomenon; the negative, however, points to impediment of conduction, to an affection of the middle ear. The duration of secondary perception can be made use of with reference to the duration of primary perception for differential

diagnostic purposes, an essentially shortened duration of secondary perception with prolonged or unabbreviated duration of primary perception pointing to a medially located resistance. According to Bing this new experiment is a better test for the diagnosis of impediment of conduction of sound than Rinné's experiment.

POLLAK.

16. ZIEM prefers the examination of the naso-pharyngeal cavity with the finger to the examination with the mirror or palate-hook respectively. In children palpation only can be used. Other patients prefer it to the introduction of mirror or palate-hook. In certain cases, as *e. g.* in hypertrophy of the posterior ends of the turbinated bodies, abscesses in the region of the pterygoid processes of the sphenoid bone, it leads to positive results. In addition the operations in the naso-pharynx are facilitated by the simultaneous introduction of the examining finger.

BOK.

c.—EXTERNAL EAR.

17. FOSTER, M. L. Traumatic occlusion of the external auditory meatus. *N. Y. Med. Jour.*, July 18, 1891.

18. LICHTENBERG, Budapest. A case of osteoma of the cartilaginous portion of the external auditory meatus. (*Un cas d'ostéome de la portion cartilagineuse du conduit auditif externe.*) *Revue de laryng.*, etc., No. 19, 1891.

19. KRAKAUER, Berlin. A case of multiple formation of exostoses upon the skull with facial atrophy of one side. *Monatsschr. f. Ohrenheilk.*, No. 10, 1891.

20. SOULS, FERDINAND. Contribution to the study of otomycosis. Bordeaux, 1891.

21. PRICE, GEO. H. Wheat in the ear. *Ophthalm. Record*, September, 1891.

22. Prof. BEZOLD, Munich. Operative removal of foreign bodies from the tympanic cavity, with ablation of the soft parts lining the osseous portion of the external auditory meatus, and chiselling of the margo tympanicus. *Berliner klin. Wochenschr.*, No. 36, 1891.

17. FOSTER gives the history of the case of a boy of eleven years who was injured by a heavy box falling on him, making a lacerated wound which separated the lobe of the right ear from the cheek, and also caused a wound within the auditory canal on

its anterior wall, through which a probe could be passed towards the median line under the right cheek to the outer canthus of the eye. He was seen by Foster three months later, and the external meatus was found to be occluded by a mass of tissue covered by integument and situated a quarter of an inch internal to the tragus. A small opening was found in the upper outer quadrant, which led into a larger cavity. This opening was dilated with a Weber's probe and a piece of indiarubber drainage-tube introduced in the following manner: A bit of rubber tubing was stretched over a probe which held one end of the tubing fixed by means of its forked extremity. The probe, with the tube tightly stretched over it, was introduced into the cavity and the free end of the tube released, thus causing it to assume its natural size. This made constant and even pressure on the sides of the opening. After some days a larger tube was introduced in the same way. His hearing power has been very much increased.

SWAN M. BURNETT.

18. LICHTENBERG reports a case of osteoma of the cartilaginous portion of the external auditory meatus, which he removed by operation. This is, according to the author, the first published case of the kind, whilst osteomata of the osseous portion of the external auditory meatus are not of rare occurrence.

BOK.

19. This affection was observed in a scrofulous girl of twelve years. In addition to other exostoses upon the skull one external meatus presented formation of exostoses, which, after ablation of the auricle, were found to be three in number, attached by broad bases to the postero-superior wall of the external auditory meatus. *They were chiselled off in one piece together with their bases.* Recovery took place without complication; otorrhœa ceased.

KILLIAN.

20. The following fungi occur in the external auditory meatus, according to the author's careful investigations: *Aspergillus fumigatus*, *flavescens*, *nigricans*, *malignus*, *nidulans*, *Eurotium aspergillus repens*, *Verticillium graphii*, *Penicillium glaucum*, *Mucor corymbifer*, *septatus*, and *Microsporon furfur*. They occur principally during the ages of sixteen to twenty. The male sex furnishes the greatest number (two thirds), and among these, principally gardeners, farmers, and those residing in ill-ventilated rooms (Russians). Sequelæ of mycosis are otorrhœa serosa, purulenta,

otalgia, deafness, tinnitus. The liability to invasion is favored by superficial inflammation, epithelial abrasion, the presence of ceruminous plugs, or by otorrhœa. Occasional causes are the introduction of fat, water, or instruments. Fungi have never been found in the cartilaginous portion of the meatus or on the auricle. The diagnosis is based upon the partly characteristic appearance of the microscopical specimens. In some cases it is necessary to prepare cultures. The prognosis is always favorable. The treatment consists in the removal of the membranes formed by the fungi, and in irrigations with antiseptic solutions (?). Fat ought not to be used. Bok.

21. PRICE, in removing some impacted cerumen from the ear of a girl of sixteen, found a hard substance lying close to the membrana tympani. He finally got it away with instruments and on examination it proved to be two grains of wheat which must have got in at least ten years ago. SWAN M. BURNETT.

22. The foreign body was a stone of the form of a quadrilateral, flat pyramid, "the base of which was of an oval, bean-like shape, corresponding entirely to the transverse section of the osseous external auditory meatus in its inner portion"; by improper attempts at extraction the stone was pushed forward into the tympanic cavity, where it was firmly wedged in. "The procedure used in this case for the removal of the foreign body from the tympanum differed in two respects from the usual methods: (1) After ablation of the auricle the cartilaginous portion was not separated from the osseous, but the soft parts were dissected according to Stacke as a whole from the meatus; and (2) it was not necessary to chisel off the external meatus from the outside, but it sufficed to chisel around the membrana tympani in the innermost portion of the meatus." A small hook of soft iron was used for rolling the stone out of the cavity. Recovery *per primam* without stenosis of the lumen of the external meatus.

RUMLER.

d.—MIDDLE EAR.

23. MIOT, C. Deafness caused by the membrana tympani or the ossicles in dry otitis media, and means of remedying the same. (De la surdité déterminée par le tympan ou les osselets dans d'otite moyenne sèche, et des moyens d'y remédier.) *Revue de laryngol., d'otolog., etc.*, 1891, Nos. 16 and 17.

24. UTKE, LARSEN, Copenhagen. Thirteen cases of partial deafness with stricture of the Eustachian canal treated by electrolysis. *Nord. med. Arkiv.*, vol. xxiii., No. 10.

25. MÜLLER. Remarks on the clinical importance of certain perforations of the membrana tympani. From the aural clinic at Jena. *Arch. f. Ohrenheilk.*, vol. xxxii., p. 85.

26. HAUG, Munich. Snuff tobacco as a cause of acute otitis media. *Ibid.*, p. 171.

27. WÜRDEMAN, H. V. Erysipelas and acute suppuration in the middle ear. *Medical News*, November 21, 1891.

28. BURNETT, C. H. Excision of the membrana tympani, malleus, and incus as a means of treatment in otitis media catarrhalis chronica and in otitis media purulenta chronica. *Four. Amer. Med. Assoc.*, September 26, 1891.

29. LUC. Two cases of recovery of chronic suppuration of the tympanum as a result of excision of the malleus. (Deux cas de guérison de suppuration chronique de la caisse à la suite de l'excision du marteau.) *Arch. intern. de lar.*, etc., 1891, No. 5.

30. UCHERMANN, Christiania. Caries of the head of the malleus. *Magazin for Lagewidensk.*, October, 1891.

31. GELLÉ. Otitis purulenta, cerebral symptoms subsequent to posterior plugging in severe epistaxis. (Otite suppurée, accidents cérébraux à la suite du tamponnement postérieur dans une epistaxis grave.) *Bull. de la soc. de laryng.*, etc., November 6, 1891.

32. DENCH, E. B. Chronic non-suppurative inflammation of the middle ear. *N. Y. Med. Jour.*, September 26, 1891.

33. WÜRDEMAN, H. V. Primary periostitis of the mastoid. *Four. Amer. Med. Assoc.*, October 31, 1891.

34. SCHENCK, H. D. Mastoid periostitis. *Four. Ophth., Otol. and Laryng.*, October, 1891.

35. POULSEN, K., Copenhagen. Cerebral affections subsequent to chronic otitis media. *Nord. med. Arkiv.*, xxii., Nos. 8 and 15.

36. JOURDANET, L. G. Contribution to the study of cerebellar abscesses consequent to otitides. (Contribution à l'étude des abcès du cervelet consécutifs aux otites.) *Thèse de Lyon*, 1891.

37. JANSEN, Berlin. Cerebral abscess due to aural affection. *Berliner klin. Wochenschr.*, 1891, No. 49.

38. MAX, EMANUEL, Vienna. Bilateral necrosis of the cochlea with consequent meningitis and exitus letalis. *Wiener med. Wochenschr.*, 1891, Nos. 48-51.

23. MIOT, in cases of deafness due to dry otitis media employs two methods of operation. In the first the membrana tympani and the handle of the malleus are excised. In the second (radical) the drum-membrane, malleus, and incus are extirpated. The operation is based upon the idea of the necessary preservation of the artificial opening in the membrana tympani. The removal of the membrana tympani and of the handle of the malleus is sufficient, if the drum-membrane is considerably thickened, if the chain of ossicles is freely movable, and if the formation of a cicatricial membrane is not to be dreaded. (Such cases are probably very rare,—H. K.) If the mobility of the ossicles, however, is impeded and cicatrization in place of the drum-membrane is expected or has taken place, the entire malleus and incus should be removed. During the operation the chorda tympani and the stapes ought not to be injured. After a properly done operation no complication occurs, except a discharge, more or less considerable which in most cases rapidly ceases. The result is extremely favorable with reference to tinnitus and deafness, the latter being frequently improved to an astonishing degree. For the after-treatment vaseline with a small addition of iodine is recommended. In conclusion the author reports five cases treated according to this method, in which the result was very favorable.

BOK.

24. LARSEN UTKE has used electrolysis for stenosis of the Eustachian tube (in thirteen cases), as described in the *Lancet* by Dr. Stevenson on November 24, 1888 (in seven cases). He rejects the method since it has not even fulfilled the most modest expectations.

E. BREMER.

25. MÜLLER distinguishes perforations, apart from their causes, according to their seat, form, size, and number. From the perforations in the lower portion of the drum-membrane, situated intermedially between the handle of the malleus and the bony furrow, and occurring in acute processes of the middle ear, Müller separates those located at the *light reflex* as an especial subdivision, because of their more unfavorable prognosis; they close more slowly and cause extreme disturbances. The closure of the perforation is rendered difficult by the fact that the fibres at the

light reflex are shorter and more strongly stretched than those of the surrounding radiating fibres, and that they are to be considered as an attaching ligament for the lower extremity of the handle of the malleus. Hence it follows, that in more or less considerable destruction of the fibres at the light reflex, the handle of the malleus, deprived of its normal lower attachment, is retracted inward, that the radiating fibres of the membrana tympani adjoining the light reflex become more tensely stretched, and that their normal nutrition and regenerative power are thereby interfered with. *Central perforations* are called by Müller, "those which are situated close to the lower extremity of the handle of the malleus, having destroyed the radiating fibres which are free from circular fibres." The central perforations occur at first as *kidney-shaped*, then with increasing destruction of the margins of the perforation as *heart-shaped*, and finally as *complete perforations*. Müller discusses the treatment of all above-mentioned perforations, which consists especially in tenotomy of the tensor tympani. If the stapedial plate is movable, the labyrinth pressure is thereby relieved, and subjective noises, headache, and vertigo are thus removed.

"In large defects of the membrana tympani, particularly in its destruction, the upper margin excepted, with foreshortening of the handle of the malleus, and also in complete perforations, the tenotomy is followed by extraction of the malleus, or that of the malleo-incus respectively," this being the only means of definite cure of otorrhœa. Müller proves the correctness of his views by nine histories of cases (in six patients with perforation at the light reflex, two with kidney-shaped and one with heart-shaped perforation). "In all cases the discharge ceased after a few days, frequently the next day in those patients who were treated for suppurative otitis media (six cases)." The perforation became smaller, in seven cases the hearing improved, "and in two cases tenotomy removed completely the distressing subjective symptoms."

RUMLER.

26. The patient, who was not an habitual snuff-taker, had sneezed violently after a snuff. "He intended to suppress the expiration and sneezed with the mouth entirely closed and the head inclined downward." The left ear felt at once "like beaten," Intense pain and deafness. Three days later the patient was examined by HAUG. The patient had never suffered from aural disease. An extreme otitis media was found in the left ear.

After paracentesis a small amount of blood escaped with the purulent discharge from the wound, and in the cotton introduced for the absorption of the secretion granules of snuff tobacco were detected. The following day three small granules of snuff-tobacco were removed.

RUMLER.

27. WÜRDEMANN gives the history of three cases of acute suppurative otitis media which were accompanied by severe erysipelas of the face. He thinks the ear lesion was the starting-point of the erysipelatous attack.

SWAN M. BURNETT.

28. The indication for the excision of the membrana tympani and the two large ossicles are considered by BURNETT to be : 1. The deafness, tinnitus, and vertigo of otitis media catarrhalis chronica, especially where adhesions exist between the membrana and the promontory, or there is evidence of synechiæ between the ossicles. 2. The suppuration, deafness, tinnitus, vertigo, headache, and recurring earache of otitis media purulenta chronica. The operation is done in all cases under an anæsthetic. The initial incision in cases of chronic catarrh is made behind the short process of the malleus and the incus-stapes joint exposed. The incus is then detached from its connection and removed. The tendon of the tensor tympani is severed, and then the membrana tympani, by a sweep of the knife, detached at its periphery and drawn out with the malleus attached. In none of the cases has he done the operation until all other rational means had failed. In no case of chronic catarrh has any bad result followed even when no good was accomplished. There was nearly always a relief from the sensation of pressure and fulness in the ear, the next most constant result being a relief from tinnitus and aural vertigo. There was less frequently an improvement in hearing.

In cases of chronic otitis media purulenta the operation has not failed to stop suppuration in any case in which the writer has employed it, and in attic cases with a normal atrium, and with a perforation only in the membrana flaccida it is the only remedy. Hearing generally improves, and the vertigo, headaches, tinnitus, and frequent "gatherings" are permanently relieved.

These are the general results arrived at by the author from a considerable experience, but no individual cases are given.

SWAN M. BURNETT.

29. LUC reports two cases of chronic suppuration of the middle ear with recovery after extraction of the malleus. The operation

is indicated if the malleus (or the ossicles) form the starting-point for the chronic suppuration, or if an exact curettement of the entire tympanic cavity cannot be carried out until after the extraction of the malleus.

BOK.

30. UCHERMANN presented a patient before the Medical Society of Christiania, whose malleus had been removed for offensive purulent otorrhœa of long standing. He cautions against their immediate removal in every case of caries of the ossicles, particularly when the hearing is still well preserved (whisper heard at a distance of 2-3 metres). In many cases drugs are still of value. It is of importance with respect to hearing whether the incus is also removed or not. In many cases the removal of the malleus only is sufficient, even if the incus is implicated. The advantages are, that the malleus can be excised with little loss of membrana tympani, and with safer and greater cicatrization. In these cases the result, so far as concerns hearing, is usually better than with simultaneous removal of the incus, provided that it is still connected with the stapes. It is, at any rate, not difficult to remove the incus afterwards, if necessary, in order to stop the discharge more rapidly.

UCHERMANN.

31. GELLÉ enumerates the frequency of purulent otitis media after posterior plugging of the nose. This complication, which is very familiar to every specialist, is still quite unknown to many general practitioners. The author demonstrates, that the cause is not to be looked for in the character of the plug, but that plugging itself is injurious, and the longer the plug remains in place the greater is the danger. It should be added that epistaxis may be a symptom of otitis media. In the discussion, following this communication, Saint-Hilaire, Chatellier, Lubet-Barbon, Luc, and Gouguenheim agree as to the injuriousness of posterior plugging and its frequent uselessness in the treatment of epistaxis, which, as it is well-known to-day, arises most frequently from the anterior portion of the nasal septum.

GELLÉ.

32. In this article DENCH gives the results of the treatment of thirty-eight carefully observed cases of chronic non-suppurative inflammation of the middle ear. Of the thirty-eight cases six were practically cured, twenty-eight were improved, three were unimproved, and one was made worse. As tests he uses the whispered voice and tuning-forks. Of the latter he uses five, varying in vibration from C to C^v. The majority of those

reported cured were young, though the disease had existed for periods varying from one to several years. The exact amount of improvement in those who were simply improved is not stated. The treatment consisted in inflations generally with the catheter, followed in some cases by vapor of iodine and camphor introduced through the catheter. The author thinks the benefit is derived solely from a mobilization of the stiff tissues and not from an opening up of communications of the drum cavity with the outer air. He has tried other forms of mobilization from the exterior, and he thinks with benefit. The use of various ear trumpets for a certain period each day, he thinks very beneficial in its direct action on the membrana and ossicles, and also on the cerebral centres for hearing.

SWAN M. BURNETT.

33. WÜRDEMANN gives the history of two cases of periostitis of the mastoid which he considers primary. In both there was fever. In the first, a woman of thirty, the hearing was normal and the membrana tympani showed no changes. A Wilde's incision gave relief to the pain and swelling; no pus found. The second case, a man of fifty-four, had some middle-ear trouble with perforation of the drumhead. A Wilde's incision gave escape to a quantity of pus, and revealed a soft spot on the surface of the bone. All the symptoms were relieved.

SWAN M. BURNETT.

34. In SCHENCK's case there was an acute purulent otitis media in a boy of fourteen years which had been treated with insufflations of boric acid for some time before he saw him. There was at that time a swelling behind the auricle and above it, which gradually travelled forward to the temple. As soon as it was beyond the temporal artery an incision to the bone was made. No pus was found, but the bleeding was profuse. Pain was relieved at once and the ear was treated by peroxide of hydrogen. Schenck thinks the trouble could have been avoided by a thorough cleansing of the ear at the beginning and the avoidance of the boric-acid powder.

SWAN M. BURNETT.

35. POULSEN reports in his full and elaborate paper, which is worth reading, thirty-six cases, of which four recovered and thirty-two died. There were thirteen cases of cerebral abscess with two recoveries, twelve of sinus thrombosis with one recovery, ten of meningitis with one recovery, and one of hæmorrhagia meningealis basis cerebri. If chronic otitis media is followed by

cerebral symptoms and if retention of pus in the tympanic cavity or in the mastoid process can be excluded, there are four complications to be considered, viz., cerebral abscess, meningitis, sinus thrombosis, and episcleral abscess. The diagnosis can be easily made if the various symptoms are very much marked. In most cases, however, the nature of the disease is so obscure as to render even diagnosis of a probability quite difficult. The cerebral abscess is usually located in the temporal lobe (nine cases ; seven adults, two children), less frequently in the cerebellum (four cases ; three adults, one child). It is frequently latent, without fever and without objective symptoms. Death may ensue occasionally by perforation into the ventricles or by diffuse meningitis. Headaches (partly in attacks), nausea, vomiting, vertigo, fever and retardation of pulse are usually met with ; less frequently pareses and convulsions (strabismus, disturbances of speech, etc.). These symptoms are not pathognomonic, though the retarded pulse is more so, although it also occurs in extensive epidural abscess. Rigidity and increased sensibility of the muscles of the nape of the neck were present only in one case. The variation of sensory symptoms is of value in the diagnosis, and especially for differential diagnosis the well-nigh exclusive occurrence of the abscess in chronic otitis media may be predicated.

The pathologico-anatomical examination of the abscesses in the temporal lobe gives the following result : Carious destruction of the tegmen tympani (2 cases), circumscribed purulent meningitis of the lower surface of the lobe and adhesion with the pars petrosa (3 cases). In abscesses of the cerebellum carious destruction of the mastoid cells or purulent sinus thrombosis is usually present (in 3 of 4 cases). In the fourth case suppuration near the foramen jugulare was found, probably extended along the aquæductus cochleæ or the acoustic nerve.

In meningitis the symptoms consist essentially in headache, general hyperæsthesia, high temperature, and accelerated pulse, which are followed by delirium, spasms of the extremities, trismus, and strabismus. If the medulla spinalis is implicated, lancinating pain in the lower extremities, frequently quite violent, opisthotonus and rigidity of the muscles of the nape of the neck are present. The pupils in meningitis cerebelli (also in cerebellar abscess) are at first contracted, later dilated. In three, among the eight cases no direct connection between the aural affection and

meningitis was found. In one case the tegmen tympani was missing, consequent on ulcerative processes; in two cases a great amount of pus was found in the sigmoid fossa (in one of which, with perforation into the mastoid cells). In two cases the infection was probably spread along the acoustic nerve. The meningitis was in all cases diffuse and especially marked at the base. In sinus thrombosis high fever, repeated chills, and the usual cerebral symptoms are present. The diagnosis is well established by additional œdema over the mastoid process, the temporal region, and the eyelids, by swelling and redness of the conjunctivæ, exophthalmus (thrombosis of the cavernous sinus), and particularly by swelling and increased sensitiveness along the internal jugular vein, which is felt as a hard and sensitive cord along the œdematous neck; although these pathognomonic symptoms proper were observed but twice among all twelve cases, the correct diagnosis was nevertheless made. In one case infiltration of the neck below the mastoid process, in another œdema of the eyelids, were observed. The pulse had a frequency of 80 to 100 and more; pyæmic fever, metastatic pulmonary abscesses were also present. In three cases articular metastases occurred. In sinus thrombosis epi- and sub-dural abscess are not unfrequently found, the subdural usually in the sigmoid fossa.

The author recommends the following method of operation: If in the course of otitis media cerebral symptoms occur, retention of pus in the tympanum or in the mastoid process should be borne in mind. He would open the mastoid, even if symptoms pointing to the latter are wanting. If the symptoms continue and the diagnosis is not established, he would trephine toward the transverse sinus (1" behind and $\frac{1}{4}$ " above the centre of the osseous external meatus. An epidural abscess may here be found. The sigmoid fossa can be explored with the probe. If no abscess is present, but the wall of the sinus covered with pus, he would attempt the puncture of the cerebellum. In order to gain room, it would be necessary to extend the resection somewhat posteriorly and downward. If the result is negative, he would puncture the sinus, and, if pus is found, he would incise. If the wall is normal he would first trephine on account of a possible temporal abscess ($1\frac{1}{4}$ " above and behind the external meatus). Unless an epidural abscess is here found, the lobe may be punctured. If here also nothing is detected, the cerebellum should be trephined as above and punctured. If, however, pus is present, the opening

established by trephining should be enlarged, and the covering skin removed. Temporary resection according to Wagner may also be made. Temporal abscesses were found on the right side in 6 cases, on the left in 3; sinus thrombosis on the right in 8, on the left in 3 cases; cerebellar abscesses on the right in 1 case, on the left in 3 cases; and meningitis on the right in 6, and on the left side in 3 cases.

UCHERMANN.

36. The complications from the cerebellum following otitis media are less frequent than those from the meninges and cerebrium. JOURDANET in his inaugural dissertation cites several observations in illustration of this subject. Cerebellar abscesses are much more frequent in adults than in children, and occur in some cases (5 per cent.) simultaneously with those of the cerebrium. In some cases they are separated from the original inflammatory seat by a layer of healthy tissue; they are, though, as a rule, connected with it. They may be complicated with sinus thrombosis, basal meningitis, visceral lesions, etc. The diagnosis of these tumors, which is very difficult, is not made clearer by the author's observations. After unsuccessful trephining in the region of the temporo-sphenoidal lobe, trephining of the cerebellum is most frequently attempted. The author points out the carefully selected starting-point for the trephine. It is situated (like that of Poirier) in the centre of a line connecting the tip of the mastoid process with the tuberculum occipitale externum.

GELLÉ.

37. JANSEN reports a case in which from gradually increasing paralytic symptoms an abscess could be exactly localized in the temporal lobe. The operation verified the correctness of the diagnosis. The paralytic symptoms gradually decreased and the patient could be discharged as cured after two months. The patient, however, had a relapse at his home after a few days, with the same symptoms as before, lost consciousness, and died. Jansen then reports cases of cerebral abscess consequent to otitis media, which had been observed during the last two and one half years at the aural clinic of the Royal University at Berlin. "There were seven cerebral abscesses among about five thousand purulent and inflammatory processes of the middle ear." An abscess was diagnosed and localized in the right temporal lobe of the operated patient. A diagnosis of a probable abscess in the left temporal lobe without localization was made in the only case in which the

mastoid process had not been opened. Intracranial complications were assumed in two cases of cerebellar abscess, which succumbed rapidly before a second operation. "In the three remaining cases the result of the autopsy was a surprise to us."

RUMLER.

38. The case was that of a man, aged twenty-three, who had suffered from bilateral purulent middle otitis, due to variola contracted in the seventh month of age. The transference of the process from the tympanum to the inner ear was marked in the left ear by acute symptoms, as fever, headache, and vomiting, while in the right ear the affection set in with less pronounced symptoms. Exfoliation of sequestra followed in the right ear after seven, and in the left after three, months. Facial paralysis made its appearance on the right side after a two months' duration of the pain, on the left side after one month. The sequestrum exfoliated from the right ear contained the entire cochlea, that of the left formed a slightly curved tube, $\frac{1}{2}$ cm long, divided interiorly by a wall into two parts, which belonged to the lower cochlear turn. The examination of hearing revealed absolute anæsthesia of both nervi acustici for speech and noises, the tuning-forks C², C³, C⁴ being perceived neither by aerial nor by osseous conduction; C¹ and C being felt, but not heard. The pain was the first symptom of an affection of the inner ear. Disturbances of equilibrium were not marked until the other side was affected, when the symptoms of destruction assumed such proportions as not to permit the patient the slightest movement without danger of falling. The maintenance of equilibrium gradually returned when compensated for by the other senses. Subjective noises developed in the right ear after exfoliation of the cochlea, in the left before beginning of the pain, and were of an intermittent character. The patient finally died from meningitis. It is to be regretted that an autopsy was not held.

POLLAK.

c.—NERVOUS APPARATUS.

39. Prof. Dr. MINKOWSKI. Contribution to the pathological anatomy of rheumatic paralysis of the facial nerve. *Berliner klin. Wochenschr.*, 1891, No. 27.

40. FREUND and KAYSER, Breslau. A case of neurosis from fright with anomalies of hearing. *Deutsche med. Wochenschr.*, 1891, No. 31.

41. LARSEN, T. C., Copenhagen. Et Tilfælde af cerebro-spinal meningitis, Kompliceret und Oerelidelse. Død, Sektion. *Nord. med. Arkiv.*, vol. xxii., No. 14.

39. A case of an undoubtedly rheumatic paralysis of the facial nerve eight weeks after the beginning of the affection was accidentally examined post mortem and the nerves could thus be pathologically investigated. Apart from other symptoms, the patient had presented, a week after the beginning of the affection, decrease of sensation of taste in the anterior portions of the left half of the tongue, sensation of dryness in the left half of the oral cavity, slight increase of perception of hearing (hyperacusis) in the left ear. On *post-mortem* examination "an extremely developed degeneration of the nerve was found from the ganglion geniculi downward to the periphery, while the affected nerve was completely normal at the root and after its entrance into the Fallopian canal to the ganglion geniculi." "In the nervus petrosus superficialis major only some degenerated fibres were found, as well as in the nervus stapedius."

40. We would emphasize from the interesting lecture the points referring to the disturbance of hearing. Lightning strikes the ground very closely to a man, who experiences tinnitus and vertigo. Both membranæ tympani, the integument of the external meatus, the nasal mucous membrane became completely anæsthetic, complete deafness in the left ear, extreme deafness in the right ear. The bone-conduction is entirely destroyed. In closing the lids a subjective and objective noise develops in the left side, apparently a muscular sound due to the tensor tympani, which can be demonstrated from the movement of the membrana tympani with the aid of a monometer. The deafness is undoubtedly due to an affection either of the sound-perceiving apparatus or of the central organ.

NOLTENIUS.

41. The patient, a girl aged seven, became hard of hearing on the tenth day of a cerebro-spinal meningitis, completely deaf on the sixteenth, and died on the thirty-seventh. *Post mortem*: Membrana tympani normal. Extensive injection of the entire mucous membrane of the tympanic cavity, Eustachian tube, and antrum mastoideum; these cavities being filled with muco pus. In the porus acusticus internus the nerves are embedded in pus. Canales semicirculares filled with reddish soft tissue (connective tissue with round cells in fatty degeneration and blood corpuscles),

the membranous labyrinth not recognizable ; in the vestibule and cochlea the same condition prevails, some pus being found in addition in the left vestibule. Considerable purulent meningitis of the convexity and base ; medulla spinalis also embedded in purulent exudation. The microscopical examination of the acoustic, and also of the facial, cochlear, and vestibular nerves does not reveal any pathological changes. The aural affection was apparently directly dependent on the meningitis. The author considers this case as the initial stage of the disease described by him and Dr. H. Mygind (*Arch. f. Ohrenheilk.*, 1890, p. 188), with ossification of the labyrinth.

BREMER.

f.—NOSE AND NASO-PHARYNX.

42. Prof. KESSEL, Jena. Some remarks upon the importance and methods of examination of the nasal and naso-pharyngeal cavity. *Correspondenzbl. d. Allgem. ärztl. Vereins von Thüringen*, 1891.

43. DEMME. Ozæna. *Deutsche med. Wochenschr.*, No. 46, 1891.

44. WAGNER, Halle. Cerebral affections after simple nasal operations. *Münch. med. Wochenschr.*, No. 51, 1891.

45. GRÜNWALD, Munich. Contribution to the surgery of the upper respiratory passages and their adnexa. *Ibid.*, No. 40.

46. KILLIAN, Freiburg. Notes upon the application of trichloroacetic acid. *Ibid.*, No. 39.

47. CHOLEWA, Berlin. Resection of the nasal septum. *Monatsschr. f. Ohrenheilk.*, etc., No. 9, 1891.

48. LEWY, B., Berlin. The occurrence of Charcot-Leyden's crystals in nasal tumors. *Berliner klin. Wochenschr.*, No. 33, 1891.

49. NATIER. Mucous polypi of the nasal fossæ in children up to fifteen years of age. *Annales de la polyclinique de Paris*, July, 1891.

50. WAGNER, R. Rhinolith. *Münchener. med. Wochenschr.*, No. 48, 1891.

51. NITSCHKE, Salzbrönnen. Case of bilateral rhinoliths. *Monatsschr. f. Ohrenheilk.*, No. 7, 1891.

52. BLOCH. Contribution to the treatment of empyema of Highmore's antrum. *Münch. med. Wochenschr.*, No. 34, 1891.

53. STEINTHAL. Contribution to the treatment of empyema of the frontal sinus. *Württemb. med. Correspondenzbl.*, No. 31, 1891.

54. Prof. VINC. COZZOLINO. Armamentarium and surgical technique of the treatment of nasal affections. (L'instrumentario e la tecnica chirurgia pei seni nasali. *Bollet. delle Malattie dell' Orecchio*, etc., No. 6, 1891.

55. WAGNIER, Lille. Contribution to the study of the relations of adenoid tumors of the naso-pharynx to otitis media purulenta chronica. (Contribution à l'étude des rapports des tumeurs adénoïdes naso-pharyngiennes avec l'otite moyenne purulente chronique.) *Revue mens. de laryng.*, etc., No. 14, 1891.

56. RUALT, ALB. The instruments for the removal of adenoid tumors of the naso-pharynx. (Sur le manuel opératoire de l'ablation des tumeurs adénoïdes du pharynx.) *Arch. internat. de laryngol.*, etc., No. 5, 1891.

57. DÉLIE D'YPRES. Adenoid vegetations of the naso-pharynx. Relapse with sarcoma. Sudden death. (Végétations adénoïdes du pharynx nasal. Récidives sarcomateuses. Mort subite.) *Revue mens. de laryngol.*, etc., No. 18, 1891.

58. HAGEDORN. Galvano-caustic treatment of pharyngeal diphtheria. *Deutsche med. Wochenschr.*, 1891, Nos. 28 and 29.

59. STRÜBING. Contribution to the treatment of diphtheria. *Ibid.*, 1891, No. 48.

42. KESSEL briefly describes the anatomy and physiology of the nasal and naso-pharyngeal cavities. We confine ourselves to emphasizing certain views of the author. The great relief experienced by the patients operated on for adenoid vegetations, with reference to improvement of thinking, in some cases of hearing and of sight, is explained by Kessel through alteration of the cerebral pressure. On account of the connection of the cerebro-spinal fluid with the system of nasal lymph vessels, the greatest amount of the former is brought freely to the atmosphere, forming the main source for the nasal moisture. Kessel believes himself justified in considering the system of nasal cavities as "respiratory organ" of the brain.

43. DEMME in almost all cases of ozaena has found a marked widening of the nasal dorsum and considers this abnormality as characteristic and necessary for the development of ozaena. The

microscopical examination of the mucous membrane shows the epithelial layer as thickened twenty-fold, while the glands are not essentially altered either in number or in appearance. With reference to the treatment the author obtained the best results with massage of the atrophied nasal mucous membrane, in connection with a 20 per cent. ointment of pyoktanin lanolin. The atrophied mucous membrane, which had become hypertrophied, had in some cases to be destroyed with the galvano-cautery.

NOLTENIUS.

44. WAGNER adds to three cases, collated from literature, a fourth observation of his own : The patient, æt. twenty, was cauterized with the galvano-cautery upon the lower and middle turbinated body (in furrows). On the following afternoon intense headache and rise of temperature (38° C.). On the following days two considerable hemorrhages, the latter being stopped by posterior plugging. The temperature was, an hour after plugging, 39° C. and rose on the following day to 39.8° C., associated with headache. On the third day, after 63 hours, removal of plug with simultaneous appearance of the first symptoms of meningitis. After pain had set in the right arm and humeral joint, death ensued on the 12th day *post operationem*. An autopsy was not made. There existed, according to the author, a thrombosis of the longitudinal sinus, developed from the middle turbinated body, the hemorrhage being a secondary feature (congestion). The rise of temperature after plugging is thus made clear. Hyperæsthesia of the arm and humeral joint were due to metastasis. The anatomy of the veins and lymph paths of the middle turbinated body, which was operated on in all four cases, favors the possibility of direct extension to the sinus and subarachnoidal space. MÜLLER.

45. GRÜNWARD reports the histories of two cases of operative opening of the frontal sinus. In the first case there was syphilitic caries ; although the anterior wall of the frontal sinus was chiselled off and a number of large and small sequestra, belonging to the nasal process of the upper maxilla, to the ethmoid, the nasal and the frontal bones, was removed, the deformity, nevertheless, after healing was but slight. In the second case there existed empyema of the frontal sinus and Highmore's antrum ; the latter was opened by Grünwald by chiselling, and when the suppuration from the frontal sinus retarded the healing process of the former, the latter, which had heretofore been treated with irrigations and insufflations of iodoform, was also opened. He then scraped the

cavity with the sharp spoon and plugged it. Recovery took place after not quite two and a half months without deformity.

MÜLLER.

46. KILLIAN uses a quite concentrated solution of the acid, applying it by means of a firm cotton pellet and the forceps, or with the aid of the probe mounted with cotton. In order to insure a permanent success, at least two applications are necessary. Killian uses for local anæsthesia 3-4 applications of a 20 per cent. solution of cocaine. The results, according to Killian, are not inferior to those of the galvano-cautery. MÜLLER.

47. For the operative treatment of removal of the cartilaginous septum, particularly if combined with scolioses or ridges of the osseous portion, CHOLEWA, like Hartmann, Krieg, and others, incises the mucous membrane of the diseased side with the galvano-cautery, and removes the deformed portion of the septum superiorly, posteriorly, and finally inferiorly with specially constructed chisels. The soft parts of the normal side are lifted by the elevator from the diseased side, after having severed the upper connections of the cartilaginous plate. A perforation can be avoided by constant attention paid to the normal side.

KILLIAN.

48. Formations resembling asthma crystals in appearance and chemical reaction are formed, in varying periods, in crushed pieces only, particularly of soft mucous polypi. RUMLER.

49. NATIER gives a careful report of congenital mucous polypi (communicated of late by Dr. Le Roy at the Soc. med. du VIIe arrondissement). He draws attention, from the scarcity of observations, to the rarity of the affection, since his case and that of Cardone form the only publications of this kind. GELLÉ.

50. Rhinolithis in a boy aged thirteen. The case is remarkable for the reason that as early as in the second year of age the first symptoms appeared, and the stone was completely wedged in the posterior portion of the right superior maxilla, there forming a cavity without occluding the nostril. WAGNER's explanation is, that the growing stone pushed the bone aside, preventing it from growing. The rhinolith was removed through the choanæ.

MÜLLER.

51. This remarkable case was that of a lady, aged forty, who had suffered since childhood from purulent nasal discharge and temporary frontal headache. An incrusted cherry pit, of the

shape of a thorn-apple, 2 *cm* in diameter, was found to be wedged in on either side between the middle turbinated body and the septum. The patient had come under NITSCHKE's treatment for bronchitis.

KILLIAN.

52. JURASZ has modified Krause's method in this way, employing a double-barrelled in place of the ordinary canula. Since the dry treatment did not yield special results, he had returned to irrigations. He irrigates in every case at first with water, then with solutions of creoline, and finally with water. This procedure has the advantage of insuring a good efflux. The author considers thorough cleansing as the essential part of the treatment. In addition Jurasz uses a double-edged trocar, the curvature of which extends over its entire length. For illustration of the success four cases are reported with recovery after 23, 28, 28 and 53 days, and a fifth case, in which the irrigation was made through the ostium maxillare, with recovery after 16 days.

MÜLLER.

53. STEINTHAL'S case illustrates the difficulty of recovery, even after operative opening. He had trephined and scooped out a case of bilateral empyema (fistulæ at the obital margin, no efflux of pus through the nose). The plugs were removed on the third, the stitches on the seventh, day. After a few days an orbital abscess was detected on the right, incised, and scooped out; but shortly afterwards, at first in the right and then in the left frontal sinus, additional pus gathered. After the second opening with resection of overlapping osseous edges of a great portion of the carious orbital roof, and after establishing a passage toward the nasal cavity, recovery took place without considerable deformity.

MÜLLER.

54. COZZOLINO gives a full and elaborate description of the affections of the nasal accessory cavities and their treatment.

55. WAGNIER points out that chronic purulent otitis media is of long duration and treated without success, when associated with adenoid tumors in the naso-pharynx. The suppuration, however, as is demonstrated by his cases, ceases immediately after the removal of these tumors. This is explained by the fact that the adenoid tumors form a mechanical impediment and produce hyperæmia and catarrh of the Eustachian tube.

BOK.

56. RUAAULT recommends for general use a method for the removal of adenoid vegetations, successfully employed by him in

100 patients. The operative field, for several days before and after the operation, is antiseptically treated with insufflation of salol or aristol. The operation is performed at one sitting in narcosis with the head hanging down, with the aid of forceps devised by the author, which should be repeatedly introduced until all parts are thoroughly removed. It is necessary to explore the naso-pharynx with the finger before the introduction of the instruments. The advantages of this method consist in the fact that no relapses occur, and no complications, as fever, otitis media, tonsillitis, etc., take place on account of the previous antiseptic treatment.

BOK.

57. DÉLIE describes a case of adenoid vegetations in the naso-pharynx in an otherwise entirely normal patient, aged thirteen. The boy had been repeatedly operated; repeated relapses take place, the tumors partly filling the naso-pharyngeal cavity, associated with hemorrhages and swelling of the glands, until after a year and a quarter death suddenly ensues in the completely debilitated patient. The microscopical examination made after the first and second relapse revealed simple hypertrophied adenoid tissue. A malignant tumor was suspected after the first relapse. Toward the final conclusion the diagnosis of round-cell sarcoma was microscopically established. The author concludes from this case, that adenoid vegetations might relapse, that the relapses ought to direct our attention to the transformation into a malignant tumor, particularly after rapid development, that fully developed sarcomata do not always bleed violently, and frequently the result of the microscopical examination cannot always be substituted for other methods of examination.

BOK.

58. HAGEDORN treated thirty cases of pharyngeal diphtheria with the galvano-cautery, resulting in the death of but one patient, the average duration of recovery amounting to four and one half days, without injury to the patient and without sequelæ. Among the advantages of this method the author notes the possibility of localization, the avoidance of non-desired accidental effects, the lack of pain after applying cocaine, and the possibility of penetrating the parts. The author advises operating also those cases supposedly diphtheritic with the galvano-cautery. Gargles with antiseptic solutions are used for after-treatment.

NOLTEMIUS.

59. STRÜNG emphasizes the necessity of distinguishing in the initial stages, by culture experiments, the "real" diphtheria,

viz., that affection due to Loeffler's bacillus from pseudo-diphtheria, viz., that produced by streptococci, which resembles very much real diphtheria. In accordance with Loeffler he points out that the ideal treatment of diphtheria has to fulfil three indications: 1. To influence the vitality of the bacilli and to retard their growth, whereby simultaneously the further production of the deleterious matter is prevented; 2, to paralyze the effect of the poison upon the body which is already imbued with it; and 3, either to prevent the penetration of other micro-organisms into the soil of the mucous membrane affected with diphtheria or to destroy them respectively. Since this is possible with a certain exactness only in the initial stages, the early diagnosis is of great importance. The treatment comprises gargles or inhalations with lime water, carbolized alcohol, and sublimate, local applications with carbolized turpentine; alcohol and hydrargyrum cyanatum internally. For the exact doses see original paper. Strict attention paid to the urine protects against intoxication with carbolic acid.

NOLTENIUS.

NOTES FROM GREAT BRITAIN.

SOCIETY MEETINGS.

BRADFORD MEDICO-CHIRURGICAL SOCIETY.—At the meeting on March 15th Dr. A. Bronner showed a case of Thornwaldt's disease of the pharyngeal tonsil.

BRITISH MEDICAL ASSOCIATION—SOUTHEASTERN BRANCH—EAST SURREY DISTRICT.—At the meeting at Upper Norwood, on March 10th, Dr. G. R. Carter showed a patient who had been operated upon for subdural abscess, the result of ear disease.

CLINICAL SOCIETY OF LONDON.—At the meeting held on April 22d Mr. Arbuthnot Lane related an interesting and unusual case. A man, aged twenty-one, had his tonsil removed on December 16th, when there appears to have been considerable hemorrhage. Bleeding recurred on the 19th and again on the 20th. The patient was brought to Guy's Hospital, practically *in articulo*, on the 22d. Having introduced three and a half to four pints of salt solution into the circulation, Mr. Lane proceeded to expose the external and common carotids, and finding that there was a large pharyngeal artery present, and that other branches arose in the immediate vicinity, he decided to tie the common carotid. The patient left the hospital within a few days quite well. In the discussion which followed Mr. Harrison Cripps and others thought that, as a general rule, it was better to tie the external rather than the common carotid in these cases.

CLINICAL SOCIETY OF MANCHESTER.—At the meeting of this society on April 26th Dr. Milligan discussed the etiology and treatment of perforations of Schrapnell's membrane, illustrating his remarks with cases in which this lesion had been detected.

HARVEIAN SOCIETY OF LONDON.—The meeting of February 18th was devoted almost entirely to otological subjects. Mr.

Pepper read a paper upon "Disease of the Temporal Bone," which will be found *in extenso* in the *Lancet* of March 5th. In the discussion which followed Dr. Scanes Spicer expressed the opinion that the majority of cases of mastoid abscess were due to adenoid vegetations in the naso-pharynx. Dr. William Hill and Mr. J. Jackson Clarke referred to the normal and abnormal positions of the mastoid antrum, and sections were shown to illustrate the fact that in children the whole of the antrum was above a horizontal line drawn on a level with the upper border of the opening of the bony meatus, whereas in adults two thirds of the antrums were below this line. In all cases the space between the lateral sinus and the posterior border of the meatus was small. Dr. Macnaughton Jones showed a pocket rule and scale for handy use in these cases. In reply Mr. Pepper said that he thought that as long as there was room for the trephine immediately behind the ear accurate measurements were superfluous, and that very often the most tender spot was a good guide to the situation of the pus.

LEEDS AND WEST RIDING MEDICO-CHIRURGICAL SOCIETY.—At the meeting on February 19th Mr. Secker Walker showed some dissections of the internal and middle ears.

LIVERPOOL MEDICAL INSTITUTION.—At a recent meeting Mr. Richard Williams read a paper upon "The Treatment of Post-Nasal Growths." He uses a curved curette, which he has had made for him on the pattern of Volkmann's spoon.

MEDICAL SOCIETY OF LONDON.—At the meeting on February 29th Mr. Spencer Watson read a paper on "The Influence of Intra-nasal Obstruction on the General Health." Cases were related and drawings of specimens shown. Dr. F. de Havilland Hall and Dr. Scanes Spicer took part in the discussion which followed.

NOTTINGHAM MEDICO-CHIRURGICAL SOCIETY.—At a recent meeting Dr. Stewart read a paper on "The Nasal Cavities and their Diseases." At the same meeting Mr. A. R. Anderson, the President, related a case of nasal hydrorrhœa in a girl aged nineteen, which was found to be due to a polypoid condition of the mucous lining of the antrum, and when this was relieved a cure of the hydrorrhœa ensued.

At the meeting on April 6th Dr. W. B. Ransom and the President related a case in which a cerebral abscess, consecutive to

ear disease, had been treated very successfully by operation. The patient had had a discharge from his left ear for thirty years ; this suddenly diminished and symptoms of cerebral abscess ensued. At the operation less than the usual amount of difficulty appears to have been encountered in reaching the pus.

PATHOLOGICAL SOCIETY OF LONDON.—At the meeting on May 3d Dr. E. T. Wynne showed specimens of hæmatoma auris from the bodies of lunatics. He thought that the hemorrhage occurred not only subcutaneously but also into the degenerated cartilage.

LONDON POST-GRADUATE MEETINGS.—On Thursday, February 18th, Mr. W. R. Stewart lectured at the London Throat Hospital upon "Some Complications of Chronic Ear Suppuration."

APPOINTMENTS.

GRANT, DUNDAS, M.A., M.D., F.R.C.S., Eng., has been appointed Throat and Ear Surgeon to the West-End Hospital for Nervous Diseases.

MARSH, FRANK, M.R.C.S., L.R.C.P., Lond., D.P.H., Camb., has been appointed Assistant Surgeon to the Birmingham and Midland Ear and Throat Hospital.

BEQUESTS.

Under the will of the late Mr. CHARLES H. WAGNER, of Birmingham, the Deaf and Dumb Institution of that city has received a legacy of £100.

The late Mr. OLIVER HEYWOOD, of Claremont, Pendleton, near Manchester, has bequeathed the sum of £500 to the Manchester School for Deaf and Dumb.

INSTRUMENTS AND APPLIANCES.

A form of electric telephone has been devised by Mr. Elphinstone, of 86 Canonbury Road, London, N., to enable deaf patients to hear the conversation of a person at a distance. The apparatus consists of the usual transmitter, battery, and receiver, with a length of connecting wire. Its peculiarities are : the battery is a dry one and is contained in a small case which can be placed upon the table ; a lever fixed to this case is so arranged as to connect the battery when the elbow is rested upon it, this being the usual

position when holding the receiver to the ear. A reel is also fixed to the side of the battery-case, upon which the connecting wire can be wound when not in use.

In some forms of middle-ear deafness this apparatus will be found to be more convenient than the trumpet or conversation tube, for being at a distance there is no chance that the speaker will blow into the ear of the patient, as so frequently happens under ordinary circumstances.

Mr. Herbert Butcher, surgeon to the Birkenhead Borough Hospital, suggests a new form of tonsillotome, the main features of which are that it is worked with scissor-handles and cutting blades, and retains the spear for transfixing the separated tonsil.

In the *Lancet* of March 5th Mr. Macnaughton Jones figures the rule and scale for use in trephining the skull in aural disease, as shown by him at the meeting of the Harveian Society on February 18th.

MISCELLANEOUS.

Mr. Aitken, of Edinburgh, gives, in the *British Medical Journal* of March 5th a series of three cases in which accumulations of cerumen appear to have caused more or less severe constitutional disturbance, in one instance with definite rise of temperature. Two of these cases were in young children, and the third in an old man of eighty-one, so that they afford another illustration of the well known fact, that at the extremes of life no abnormal condition is so trivial that we can afford to overlook it.

In the *British Medical Journal* for April 9th Mr. Alexander Black suggests, for perforating the mastoid, the use of a small gimlet to make the preliminary opening into the antrum, and this opening he subsequently enlarges by means of a cone-shaped burr as used by dentists. To maintain free drainage from the cavity, he uses the spiral wire drainage tube like that employed in antrum cases.

A case of cerebral abscess following upon otorrhœa of thirteen years' duration is reported from the York County Hospital [*Lancet*, March 5th]. The patient was trephined, but during the operation a serious condition of collapse ensued, and the operation was completed under artificial respiration. One or two ounces of fœtid pus were withdrawn by means of a trocar, and the patient

rallied from the shock of the operation, but died the next day. At the autopsy, an abscess the size of a small hen's egg was found in the temporo-sphenoidal lobe.

Professor Politzer of Vienna has lately been on a visit to London, and the event was made the occasion of a very remarkable gathering of the aural surgeons of London, who, on Sir William Dalby's invitation, assembled to do the eminent otologist honor. Professor Politzer gave a highly interesting demonstration, and a short address of thanks.

Sir William Dalby's general statement to the effect that influenza has comparatively little effect upon healthy ears, and to which we referred in our last issue, is not to be allowed to pass unchallenged, for both Mr. Walker Downie, of Glasgow, and Mr. Stewart, of London, have written to protest that precisely the contrary has been their experience, and with this protest many other otologists will probably be inclined to agree.

We are, perhaps, too apt to imagine that outside the physiological laboratory, the lower animals do not lend themselves easily to the elucidation of these great problems in human physiology and pathology with which the scientific medical man of the present day is chiefly concerned. But that there is ample opportunity for really useful and interesting work in the field of clinical observation is sufficiently proved by some papers which have recently appeared in the veterinary journals.

For instance, in the *Kennel Gazette* for August, 1891, Mr. A. J. Sewell describes and figures an acarus, which he terms *Psoroptes auricularis canis*, and to which he ascribes the so-called "canker" in dogs. The interest of this observation lies in the fact that the parasite in question bears a remarkably close resemblance to the human acarus.

Again, on May 7th, 1891, Professor Fleming read before the Central Veterinary Society a paper in which he raised the question, "Does Ménière's disease occur in horses?" This paper was published in the *Veterinary Journal* for June, 1891, and is well worth reading. Professor Fleming points out that cases have been recorded in which symptoms analogous to those described as indicating the existence of Ménière's disease, or labyrinthine vertigo in man, have been observed in the dog and cat, and have been proved to have had their causation in the presence of some irritation in the external auditory meatus, such, for instance, as the

acarus above alluded to. Professor Fleming then gives particulars of the symptoms of two cases in which he was led to believe that the horses were suffering from something like labyrinthine vertigo, and certainly from the written descriptions there can be but little doubt that the diagnosis of "Ménière" was perfectly justifiable; the most marked peculiarity in each case being the tendency of the animal to fall to one side or to gyrate in one direction.

The publication of these observations naturally led to considerable correspondence, and to the expression of many opinions. In March, 1892, Mr. Goodall published the details of a case which had recently come under his observation, in which a pony suffered from symptoms almost precisely similar to those described by Professor Fleming in his cases. In this instance, however, a most careful and painstaking search was made to eliminate any possible extraneous irritation, and the result of Mr. Goodall's researches was that on scraping the ear and examining the scrapings microscopically, numerous dark fructifications of *aspergillus* were discovered, and, the case being treated with suitable fungicides, the animal made a complete recovery.

Even in the face of these observations, it would of course be rash to suggest that in the human subject labyrinthine vertigo may ever be ascribed to similar causes, but at the same time it cannot be out of place to draw attention to the possibility of such an etiology.

THE LENVAL PRIZE.—Baron Léon de Lenval, of Nice (France), offers a prize of 3,000 francs for the best application of the principles of the microphone to the construction of a portative apparatus that improves the hearing power of patients.

The competing instruments should be sent either to Prof. A. Politzer, or Prof. V. v. Lang, in Vienna, before December 31, 1892. The prize will be awarded at the 4th International Congress of Otology, September, 1893.

Members of the prize committee: A. Politzer and V. v. Lang, Vienna; Benni, Warsaw; Gellé, Paris; Pritchard, London; Roosa, New York; Grazzi, Florence.

Reviews.

Diseases of the Nose, Throat, and Ear. By P. McBRIDE, M.D., F.R.C.P. [Edin.]. Published by Messrs. Young & Pentland [Edinburg and London].

This is an excellent work, giving as it does a very complete *résumé* of the now extensive literature of the subject, compiled with great care and impartiality by a master-hand, and judiciously tempered with the author's own experience.

Dr. McBride commences with the diseases of the pharynx, then takes up those of the larynx, then those of the nose, and finally those of the ear. The two first divisions (pharynx and larynx) are not of so much interest to the otologist, especially as the nasopharynx is dealt with in the part of the work relating to the diseases of the nose, a very convenient though not perhaps a strictly anatomical arrangement.

The section on adenoid vegetations is very good, and gives the student a thorough idea of the very varied methods of treatment which are adopted by specialists. In dealing with the tests for hearing we think that the author may possibly mislead the student as to the ease with which the hearing power can be gauged by the voice; and on the contrary, we are of the opinion that he somewhat underrates the value of the tuning-fork test. To a certain extent Dr. McBride appears to agree with Gruber's apprehensions as to the possible dangers from Politzer's method of inflation, but we cannot help thinking that these dangers are more imaginary than real. The chapter on the "Complications of Chronic Suppuration of the Middle Ear" is well worth reading, and the difficult subject of chronic non-suppurative inflammation is ably discussed, though we should like to have seen more stress laid upon Politzer's researches as to the fibrous changes which occur around

the stapes in this condition. Perhaps the weakest part of the work is the chapter on the "Auditory Nerve and Labyrinth," and this we trust will be improved in the next edition.

The book is written in an easy, one might say a conversational style, and this has the effect of giving the readers that insight into the mind of the writer which is so interesting and valuable to his fellow specialists.

The work is issued in an attractive form; the colored plates are for the most part a distinct advance on the usual examples, although here and there they exhibit the failures so commonly met with in colored anatomical and pathological illustrations.

In the first paragraph of the Preface Dr. McBride says: "I have endeavored to meet the requirements of the senior student and general practitioner," and although we quite think that he has succeeded in this endeavor, yet we are also of the opinion that the work will be of greater interest to the laryngologist and aural surgeon.

Deafness and Discharge from the Ear. By Samuel Sexton, M.D., assisted by ALEXANDER DUANE, M.D. J. N. Vail & Co., New York, 1891.

A small octavo volume of eighty-nine pages, very well printed and captivantly written in easy idiomatic English, for two classes of readers, first for "numerous inquirers, specially those whose letters the author has not the necessary time at his disposal to answer," secondly, for converting those who still doubt that the "excision of the drumhead and ossicles is a potent means for the benefit and cure of a vast number of persons who labor under the manifold afflictions consequent upon chronic catarrhal and suppurative middle-ear disease." The explanatory addition of the title-page, viz.: "The Modern Treatment for the Radical Cure of Deafness, Otorrhoea, Noises in the Head, Vertigo, and Distress in the Ear," will scarcely impress the professional readers favorably. Apart from this we can only say that the little volume gives a singularly clear exposition of the indications, the execution, and consequences of this delicate operation, and seems sufficient to guide even a beginner to perform the operation himself, only for the description of the instruments the author refers to his text-book. Though the profession looks upon the popular scientific medical literature with suspicion, the little treatise under consideration will be read by the general practitioner, and even the aural surgeon, with interest and benefit. H. KNAPP.

Physiological Investigations Concerning the End Organ of the Eighth Nerve. By Prof. R. EWALD. With sixty-six woodcuts in the text, four lithographic plates, and one stereoscopic illustration. J. F. Bergmann, Wiesbaden, 1892. Reviewed by S. MOOS, Heidelberg. (Translated by Dr. WARD A. HOLDEN.)

Two years ago Ewald described experiments which seemed to show that after the destruction of the semicircular canals on one side, a stronger innervation-impulse was required to produce voluntary muscular movement on this side than on the other, and that at the same time the absolute strength of the muscles on the operated side was markedly diminished. By these disturbances, and particularly by the difference in the function of the muscles in the two halves of the body, Ewald explains all the anomalies of motility which deaf persons with affections of the utricular apparatus show, and as these are symptoms of abolition, it follows that in the normal condition the labyrinth exerts a sensory irritation, the abolition of which brings with it a disturbance of function of the striped muscular system.

In the present book, which is a most careful and painstaking experimental physiological study, the author, as the result of his experiments, arrives at a number of conclusions which are of the greatest importance to the clinician as well as to the aurist, and the results of which greatly increase our knowledge of the much-disputed question as to the function of the vestibular apparatus.

The readoption of the name "*nervus octavus*" gives the reader a hint as to the contents of the work. "The eighth nerve," says the author in conclusion, "has so many and so important functions apart from that of hearing, that it no longer seems right to call it the auditory nerve, and this name is also inconvenient in describing it anatomically. A careful separation of its fibres into an auditory and another nerve has not yet been accomplished, and therefore the old designation, *nervus octavus*, has been used."

The fact that in the embryo the vestibular branch takes on a medullary sheath sooner than the cochlear branch, thus suggesting a difference in function, also favors the author's designation.

The main conclusions are as follows: "The labyrinth consists of two apparatus, differing in function: first, the auditory organ proper, situated in the cochlea, and, according to Ewald, corresponding to the dioptric portion of the eye; and, second, an

organ which exerts an influence on muscular action, the tonus labyrinth, an organ of sense."

We commend this excellent work most heartily.

Microscopic Atlas of the Normal and Pathological Anatomy of the Ear. By Dr. L. KATZ. Part. II. Aug. Hirschwald. Berlin, 1892. Reviewed by S. MOOS, Heidelberg.

The first part of this work has been already noticed in these ARCHIVES, particularly in regard to the value of the microphotographic representation of preparations of the normal and pathological anatomy of the auditory organ.

Part II. contains twelve photographic reproductions; one normal, the ductus cochlearis of a Guinea-pig, highly magnified. The other eleven show pathological conditions of the membrana tympani, the ossicles, the cavity of the tympanum, the labyrinth wall and labyrinth structure from patients with tuberculosis, syphilis, primary and scarlatinal diphtheria, and from deaf-mutes. The photographs, while leaving much to be desired in the matter of finer cellular details, are excellent topographically.

Anatomical Observations on the Brain and Several Sense-Organs of the Blind Deaf-Mute Laura Dewey Bridgman. By HENRY H. DONALDSON, Ph.D. Reprinted from the *American Journal of Psychology*, vol. iii., No. 3, 1890, and vol. iv., 1891. Reviewed by H. STEINBRÜGGE, Giessen.

This paper contains observations on the brain and some of the sense-organs of Laura Bridgman, whose case, because of the relatively high degree of mental development obtained by the zeal and perseverance of her instructor, in spite of such apparently unsurmountable difficulties, has excited an interest throughout the whole civilized world.

The author has subjected the brain to a most thorough and careful examination from every possible standpoint. Before passing to a review of the more important results of this examination, it will be well to give a sketch of the early history of the patient, as this contains much that is indispensable in obtaining a correct idea of the pathological changes in the central organ.

L. B., of healthy parentage, had developed normally in the first two years of her life, was lively and intelligent, and could even speak a few words. At the age of two she had a severe attack of scarlet fever. Both eyes and ears were destroyed by suppuration, and taste and smell were injured by the inflammation of the naso-

pharynx. Hearing and sight were lost, the patient preserving only perception of light in the right eye until her eighth year, when this also became completely blind. Loss of speech followed loss of hearing. The tuning-fork was not heard by bone-conduction, but the patient experienced nausea and giddiness when turned about. The portion of the labyrinth serving the balance-sense seems to have suffered less from the panotitis than the cochlea.

Convalescence was slow. Her strength was regained only at the age of five. When eight years old she was placed in the Perkins Institution and Massachusetts Asylum for the Blind, which was then under the direction of S. G. Howe.

Her training began with the use of raised letters, the name of an object being placed on the object itself, and handled by the child. In this manner the mental association of the object with its name was obtained, after which the girl spelled the name with the letters, and learned the meaning of the latter. How it was possible to teach her the significance of abstract terms is not told. It sounds very improbable when we read that Laura was the author of a journal, of three autobiographical sketches, and that she had kept a journal for ten years. These results of education are the more remarkable as the sense of feel was the only one normally developed. She had some perception of noise, but this, as it appeared, was through the medium of the sensory nerves, she recognized her friends by their voice and gait through the vibrations felt in her own feet. Her sense of temperature was poorly developed. The sense of smell and of taste improved somewhat in the course of time without becoming quite normal.

She died of a lobar pneumonia in her sixtieth year.

We shall pass by that portion of the report of the autopsy which does not interest us, and take up at once the report of the examination of the brain. The meninges showed no pathological changes. The brain, eye, petrous portion of the temporal bone, and a portion of the ethmoid were removed. The brain was hardened, first in Muller's fluid, then in a 2½ per cent. solution of bichromate of potassium, and finally in alcohol.

First the volume of the brain was measured, then the weight of the whole and of the cerebellum alone, and also the specific weight of the brain substance. These measurements lay within the normal limits.

Various measurements of the brain showed that the distance between the apices of the frontal and temporal lobes was greater than the normal, and this was thought to be due to a retarded development of the temporal lobe.

When the fourth ventricle was examined, it was found that the *striae acusticae* had not suffered, but were well marked. The cerebellum showed no particular changes. In the mesencephalon the posterior corpora quadrigemina were small but well rounded, the anterior pair somewhat flattened. In the thalamencephalon the pulvinar of the left side was reduced in all its dimensions; that of the right side was spoiled for examination by being cut into while fresh. The corpus callosum was well developed.

The cerebral hemispheres showed broad gyri, the occipital pole was flattened, the left temporal lobe small, so that the left island of Reil was much less covered than the right. The lateral ventricles were not large. The frontal lobes were not so well developed, but the left was the smaller, as was also the left island of Reil. With the lesser development the sulci were shallower.

The cuneus of the right side was reduced in size. It is interesting to note that the left occipital lobe was better developed than the right. As the sight-centre is supposed to lie in the cortex of the occipital lobe, this would agree with the clinical fact that there had been some perception of light in the right eye up to the eighth year, and corresponding to this the right optic nerve and tract were larger than the left.

From the histological examination we learn that the cells of the cortex were markedly pigmented, and had irregular nuclei. The large ganglion cells were smaller than the normal, and were fewer in number in some parts. The sensory portion of the cerebral cortex had relatively fewer cells than the motor portion, and with the lesser number the cells were smaller, and the right hemisphere was more deficient in cells than the left.

The turbinate bones with the ethmoid were examined by A. C. Getshell. The bone was decalcified and cut in sections. There were found remains of a chronic nasal catarrh, consisting of a degeneration of the epithelium, an increase in the subepithelial connective tissue, and hyperplasia of the connective-tissue sheaths of the olfactory nerve, the fibres of which were otherwise normal. In the left superior meatus there was a fibrous adhesion between the septum and the upper turbinated bone, which changed

the path of the air current, and must have interfered with the smell on this side.

Both eyes were phthisical, showing no trace of retina. The extrinsic muscles were preserved, but were small. In the optic nerve there was an increase of connective tissue. The right optic nerve and tract were larger than the left.

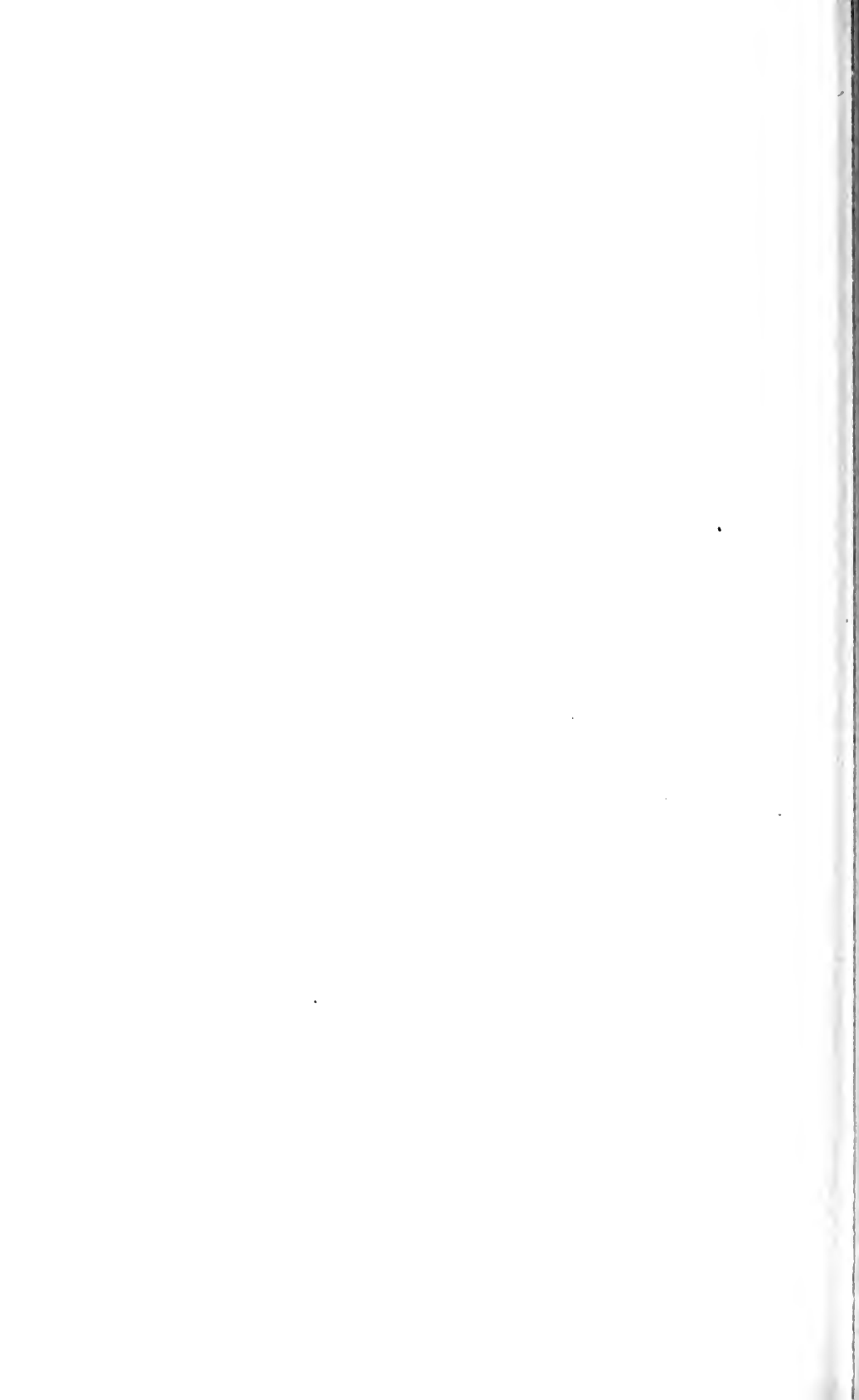
The organs of hearing were examined by W. S. Bryant and H. F. Sears. The first reported on the condition of the external and middle ear, the latter on the labyrinth. The middle ear showed the remains of severe purulent inflammation, consisting of destruction of the membrana tympani, absence of the ossicles, bony obliteration of the Eustachian tubes at the tympanic end, hyperostoses of the walls of the tympanic cavity, and ossification of the fenestræ and sclerosis of the mastoid process. The tympanic muscles were atrophic. In the left canal a pseudo-membrane had formed.

The examination of the labyrinth, possibly because the preparations were not well preserved, was less satisfactory, and we read only that in both cochleæ numerous ganglion cells were found in the ganglion spirale.

The auditory nerves were cut at a distance of 3 *mm* from their exit from the medulla. Measurements showed that they were scarcely below normal size. The nerve fibres and the connective tissue surrounding them were normal. The same was found in respect to the fibres of the auditory nerve within the medulla and the nucleus of the nerve.

Donaldson supposed that changes had taken place in the cochlea, as the tuning-fork was not heard by bone-conduction, while the vestibule and semicircular canals, from reasons above stated, may have been less affected.

In giving our judgment of this work, of which so brief a sketch has been presented, we must remember that the text of the original represents only a small fraction of the time and labor which must have been spent in the numerous literary studies, as well as in the actual examinations. The author of this work has no small claim to the thanks of many scientific circles, and we heartily commend the study of the original to such as are interested in the subject.



ARCHIVES OF OTOLOGY.

DEAF-MUTES IN DENMARK.

A DEMOGRAPHIC SKETCH BY

DR. HOLGER MYGIND, COPENHAGEN, DENMARK.

(With two wood-cuts.)

ALTHOUGH deaf-mutism is comparatively infrequent in Denmark, the public care of the deaf-mutes, and all matters concerning these, is more advanced here than in most other countries. In the beginning of the present century, at a time when deaf-mutes in other countries were only exceptionally, and then by the efforts of single private individuals, raised out of their miserable social position, the Danish government resolved to make instruction of all deaf-mutes throughout the country compulsory (1817)—a measure which is still in most other countries a *pium desiderium*. In later years Denmark has kept its place at the head of all movements concerning the public instruction of deaf-mutes, having carried out great reforms in this matter. As the principal of this must be mentioned that the deaf and dumb children called to receive public instruction are divided into various groups, according to their degree of hearing, their intelligence, etc., so that every deaf-mute is certain to receive an instruction suitable to his abilities and requirements (see below).

The circumstance that the State has taken the instruction of deaf-mutes into its own hands has led to the registration of all deaf-mutes, the object of which has been not only to control the deaf-mutes of the country, but also to collect information on various points concerning the etiology of deaf-mutism. The registration is carried out according to the

following plan : At the beginning of each year each parish clergyman—who in Denmark is a state official—throughout the whole country has to send in to the government a report of all the deaf and dumb individuals who have lived in his parish during the previous year. The first report of a deaf and dumb child is made by filling in the different questions of a schedule (see Form I. in the Appendix). Each following year the deaf-mute is reported, by the clergyman of the parish where he resides, on another schedule (see Appendix, Form II.)¹ These schedules are sent in to the Danish Ministry for Educational and Ecclesiastical Matters, which in this way is able to control every deaf and dumb individual in the country.

The present paper is principally based upon the returns sent in to the Danish Ministry for Educational and Ecclesiastical Matters in the spring, 1886, supplemented by private information from the different deaf and dumb institutions of the country, as regards the inmates of these on the first of January, 1886, kindly placed at my disposal by Messrs. JØRGENSEN (Fredericia), LASSEN (Copenhagen), and Dr. KELLER (Copenhagen). Whenever it has been desirable to supplement the answering of the different questions of these returns, I have—as far as possible—made more minute inquiries at the deaf and dumb institutions, etc. As the majority of the returns sent in to the ministry each year are of necessity issued on Form II. (see Appendix), the number of deaf-mutes “previously reported” naturally exceeding by far those “not previously reported,” I have limited the object of the present investigation to embrace principally the questions of this form only, which questions more or less tend to illustrate what I may call the demographic features of the deaf-mutes of the country. I have, however, where I have thought it necessary, supplemented the questions of Form I. with some of those of Form II., having collected all the returns issued on Form II. since 1879, and

¹ In the metropolis of Denmark there is, however, only one schedule with a very limited number of questions which are answered by the deaf-mute himself or, his relatives. The schedules are distributed and collected by the police at the “police-census,” which takes place twice a year.

up to July 1st, 1890, amounting altogether to 553. The reason why I have not used any forms dated before 1879 is simply that before this time the forms had a different shape, embracing a much smaller number of questions.¹ The other questions of Form II., which have a more direct bearing upon the causes of deaf-mutism, are under elaboration and will appear later on.

The calculations of this paper are based upon figures taken from the census of Denmark of 1880.² The relative figures may thus be somewhat too high for deaf-mutes on account of the increase of the population from 1880 to 1886, and this must especially apply to the metropolis, the population of which has increased considerably during this period of time. On the other hand, there can be no doubt whatever that there are considerably more deaf-mutes in the country than shown by calculations, whatever their nature is, as it is often late before deaf-mutism is recognized, and parents are remarkably tenacious of their hopes of an improvement in the course of time. These two facts give sufficient reason why many children are first registered when the legal age for school arrives, *viz.* : eight years of age.

The material thus used as a basis for this article has, as far as it has been in the author's power to control it, proved entirely reliable. It may be mentioned as an example that a statistical digest of questions 1 and 2 of the returns of deaf-mutes (previously reported) has yielded results which agree with the last census in all points where a comparison was possible. It must also be observed that the questions were, as a rule, answered exhaustively and intelligently, and in many cases it was evident that the greatest pains had been taken to make the answers as accurate as possible.

Finally, it must be observed that the results about to be given have been in many points compared with those gained in other countries.

¹ The forms for the report of deaf-mutes as reproduced in translation in the Appendix are made by the late director of the Royal Deaf and Dumb Institution, Rev. MALLING-HANSEN and Dr. VOHL MYGGE.

² *Statistics of Denmark*. Series 4, Libera A, No. 5. Copenhagen, 1883.

I.—TOTAL NUMBER OF DEAF-MUTES.

In January, 1886¹ there were 1,225 deaf-mutes² in Denmark proper (Dependencies not included), which, estimating the population at 1,969,039, gives 63.7 deaf-mutes per 100,000 inhabitants.

A comparison with the relative number of deaf-mutes in other European countries—making use of G. MAYR'S statement—would place Denmark fifth on the list, if the country in which there is the smallest number of deaf-mutes is placed at the head.

Holland . . .	33.5	per 100,000 inhabitants
Belgium . . .	43.9	" " "
Great Britain . . .	57.4	" " "
France . . .	62.6	" " "
Denmark . . .	63.7	" " "
Spain . . .	69.6	" " "
Italy . . .	73.4	" " "
Norway . . .	92.2	" " "
Germany . . .	96.6	" " "
Austria . . .	96.6	" " "
Sweden . . .	102.3	" " "
Hungary . . .	134.3	" " "
Switzerland ³ . . .	245.2	" " "

It will be seen from the above survey that Denmark occupies a comparatively favorable position amongst the other European countries, as far as the number of deaf-mutes is concerned, and not least in comparison to the neighboring countries.

Investigations as to the temporary or permanent nature of Denmark's favorable position in this regard are of no little interest. Census of former years yielded the following information.

¹ In 1886 not a single deaf-mute of the age of two, and only two of the age of three registered.

² George Mayr:—*Die Verbreitung, der Blindheit, der Taubstummheit, des Blödsinns und des Irrens in Bayern, nebst einer allgemeinen internationalen Statistik dieser vier Gebrechen.*—München, 1877, pp. 313 and 351.

³ According to BIRCHER'S investigations, the deaf-mute rate of Switzerland had increased to 300 in 1879 (see BIRCHER: *Der Endemische Kropf und seine Beziehung zur Taubstummheit und zum Crétinismus.*—Basel, 1883, p. 97).

TABLE I.—THE DEAF-MUTE RATE IN DIFFERENT YEARS.

Year	1855	1860	1870	1880	1887
Number per 100,000 inhabitants	57.8	54.7	61.5	63.1	63.7

It would appear from the above survey that *deaf-mutism*¹ *has been on the increase in Denmark during the last twenty-five years.* It must, however, be remembered that the figures are too small to serve as a foundation for reliable conclusions, especially when it is taken into consideration that the three last figures do not differ greatly from each other, and that the census of 1880 is the basis of the calculation of the last figure. It is even more probable that the number of deaf-mutes is, when this is written, on the decrease, as (which will be proven later on) the considerable rise in the number of deaf-mutes born in 1871–1874 (see Diagram p. 384) has been succeeded by a considerable decrease in the years following.

It is not surprising that the numerical strength of the deaf-mute population of a country fluctuates in the course of years, for deafness being not only the result of congenital pathological changes in the organs of sound, consequently not solely depending on constant, though for the most part unknown, causes, such as hereditary tendency, consanguinity, influence of soil, etc.; but epidemic diseases are often, indeed, probably most often, the cause of the deafness which gives rise to deaf-mutism. Now, as both the spread and intensity of epidemic diseases, and also their character (which latter shows itself especially in an inclination to attack certain organs) varies greatly in the course of years, it may naturally be expected that the relative number of deaf-mutes will also fluctuate in the course of years. What happened in Pomerania proves that these fluctuations can

¹ It must, however, be observed that deaf and dumb idiots and deaf and dumb blind idiots, have formerly been included amongst deaf-mutes. In this work they are not included, not being considered as deaf-mutes in the proper sense of the word, as idiocy is probably the principal disease. If such individuals, of whom there were 17 in the country in 1880 were included here, the deaf-mute rate for 1880 would be 65.9.

be very considerable, the deaf-mute rate of that province rising from 1860-1875 from 86 to 114 per 100,000 inhabitants, the cause of this increase being epidemic diseases, especially a malignant and widespread epidemic of cerebro-spinal meningitis.¹ In other countries the variations in the deaf-mute rate have been more regular; for instance, in Saxony it was 74.5 in 1836; 61.4 in 1861; 62.2 in 1864; 60.0 in 1867; 61.0 in 1875; and 58.0 in 1880.²

II.—SEX OF DEAF-MUTES.

645 of the 1,255 deaf-mutes living in Denmark in 1886 were males, 610 females; whilst, as above mentioned, there were 63.7 deaf-mutes per 100,000 inhabitants; of either sex there were 66.6 male deaf-mutes per 100,000 male inhabitants, and only 60.9 female deaf-mutes per 100,000 female inhabitants (the male and female population being estimated at 967,330 and 1,001,679 respectively).

It will thus be seen that *deaf-mutism in Denmark is more frequent amongst the male than the female population*, a fact which has been proved whenever the deaf-mute rate has previously been taken in the country. Table II. shows that there have also been fluctuations within the two sexes as to the frequency of deaf-mutism in each.

TABLE II.—NUMBER OF DEAF-MUTES PER 100,000 INHABITANTS IN DIFFERENT YEARS.

Year.	Males.	Females.
1855	67.3	49.3
1860	60.4	49.2
1870	66.6	56.5
1880	68.6	57.6
1886	66.6	60.9

According to the above it would appear that *deaf-mutism is on the increase in the course of the years amongst the female population of Denmark*, while the figures remain fairly much the same for the males.³

¹ WILHELMUND A. HARTMANN: "Taubstummten-Statistik des Provinz Pommern," etc. *Zeitschrift f. Ohrenheilk.*, vol. ix., p. 210.

² H. SCHMALTZ: *Die Taubstummten im Königreich Sachsen*, 1884, p. 11.

³ Recently UCHERMANN found in Norway a considerable increase of the male population deaf-mutes ("Deaf-Mutism, Especially in Norway," *Norsk Magazin for Læger*, December, 1890). Here and in the following the titles of all Scandinavian papers mentioned are translated.

The male population of Denmark is, as in most other countries, numerically weaker than the female, the proportion being as 100 to 103.5. The proportion between male and female deaf-mutes in 1886 was as 100 to 94.9; consequently the *male deaf-mutes are both absolutely and relatively more numerous than the females*, and the difference is considerable.

In most other countries also there is a greater number of male than female deaf-mutes, the relative difference being in most places even greater than in Denmark. E. SCHMALZ has found, from the calculations of many statisticians, that the average proportion between male and female deaf-mutes is as 100 to 74, or about as 4 to 3.¹ As far as I know, the Kingdom of Würtemberg is the only exception, there being in that country, in 1881, 57 females and 43 males per 100 deaf-mutes²; the total number of deaf-mutes was, however, only 228, a figure small enough to admit of accidental causes playing an important part.

Up to the present a satisfactory explanation of the numerical superiority of male to female deaf-mutes has been sought in vain. The causes are in all probability numerous. To begin with, it is well known that a greater number of males are born than females, and the male sex maintains its superiority, at least in Denmark, during the first two decades. Naturally more male deaf-mutes are born than female, and a greater number of boys than girls are likely therefore also to fall victims to acquired deaf-mutism, which, as a rule, appears in the earliest childhood. A comparison of the numerical strength of deaf-mutes of both sexes with the whole population in the different periods of age will be of interest in deciding how far the above two facts alone explain the numerical superiority of male deaf and dumb individuals. This will be seen from Table III., the figures of which approach closely to those of the census of 1880.

¹ *Ueber die Taubstummen und ihre Bildung*, 1848, p. 600.

² HEDINGER: *Die Taubstummen und die Taubstummenanstalten etc., des Königreichs Württemberg und des Grossherzogthums Baden*, 1882, p. 117.

TABLE III.—RELATION BETWEEN MALES AND FEMALES IN
THE DEAF-MUTE AND THE WHOLE POPULATION
BY PERIODS OF AGE.

PERIODS OF AGE.	DEAF-MUTES.		WHOLE POPULATION.	
	Males.	Females.	Males.	Females.
Under 20 years.....	100	73.6	100	98.2
20-40 years.....	100	93.4	100	107.0
40-60 ".....	100	100.0	100	105.0
60 years and over....	100	115.0	100	118.0

It will be seen from Table III. that *the numerical superiority of male deaf-mutes is much greater during the first two decades* than that of the rest of the population in the same period of age, a fact which has been confirmed by the Prussian deaf-mute statistics of 1880.¹ So great is this superiority, that it is *only after the sixtieth year* that the greater male mortality, common to the population, is able to produce *a numerical superiority amongst female deaf-mutes* in Denmark. In Prussia the males kept the upper hand until the eightieth year.

Consequently, it is impossible to explain the numerical superiority of male deaf-mutes by the fact that a greater number of deaf-mute boys are born than girls, or that the epidemic diseases causing deaf-mutism are more frequent in the years of early childhood, when the males are numerically superior to the females, unless indeed on the supposition that the mortality amongst deaf-mute boys is proportionately very slight and that of deaf-mute girls very considerable, a supposition opposed to all experience, although it is with difficulty that it can be disproved, owing to the difficulties attached to a correct estimate of the number of deaf-mutes in the early periods of age.

Another cause of the greater frequency of deaf-mutism in the male sex is perhaps the circumstance that ear diseases—and deaf-mutism depends, as is well known, upon congenital or acquired pathological changes of the organs of hearing,

¹ GUFSTADT: "Die Verbreitung der Blinden und Taubstummen," etc. *Zeitschr. des königl. Preuss. statistischen Bureau*, p. 201.

most frequently of the ear itself—are more common amongst males than females. CARUS¹ suggests this opinion when he speaks of a greater development of the fœtal organs of hearing in males, and a consequent greater tendency to pathological processes. Up to the present but little notice has been taken of this suggestion, which appears to me to be of value. Space, however, forbids a more exhaustive discussion of the subject.

Finally, it is possible that there is a connection between the above-mentioned fact and the circumstance that diseases originating in the brain (especially meningitis, or cerebro-spinal meningitis) are frequently the cause of the pathological conditions causing deaf-mutism, and much tends to prove that brain diseases, both acute and chronic, as also congenital, are more frequent in the male sex.² It is true that Danish works on deaf-mutism (MYGGE, BREMER, L. W. SALOMONSEN) do not, as a rule, consider brain diseases as an important agent in the etiology of deaf-mutism in Denmark, but this is certainly incorrect, and the fact is generally accepted to be valid for most other countries. It is well enough known that brain diseases are more frequent amongst males, when it is a question of chronic brain diseases of adults, but nothing certain is known as to the greater frequency of brain diseases in children amongst boys than amongst girls. There can, however, be no doubt that most investigators agree that epidemic cerebro-spinal meningitis (which most frequently attacks children, and plays so great a part in deaf-mutism) is more frequent amongst boys than girls.³ Finally, it must be mentioned in favor of the above supposition, that idiocy, which is either caused by congenital brain disease, or brain disease acquired in infancy, is much more common in the male than the female sex. For instance, in 1880 there were 112 male idiots in Denmark to every 100

¹ *System der Physiologie*, vol. ii., p. 253.

² It is to MR. GEORG VÖRGENSEN, superintendent of the Fredericia Deaf and Dumb Institution, that the supposition as to the importance of brain diseases in deaf-mutism is due, although, as far as I know, he has not announced it in print.

³ Since the above was written, DR. UCHERMANN, of Norway, has stated (in the paper referred to above) that in this country the male sex is predominating, especially amongst those deaf-mutes who have acquired their deafness after birth, and especially during meningitis, cerebro-spinal meningitis, otitis media, convulsions, trauma, and rickets.

female, a numerical superiority amongst the males which greatly exceeds that amongst the deaf-mutes.

III.—RELIGION OF DEAF-MUTES.

All statisticians who have entered into the question of the frequency of deaf-mutism agree that it is more frequent amongst professors of the Mosaic faith than any other. It has also been proved in many countries, where the population consists of both Roman Catholics and Protestants, that deaf-mutism is most common amongst the Catholics.

In Denmark it has been impossible to prove such a preponderance amongst Jews and Catholics (a preponderance which is of course in no direct connection with their religion, but is due to ethnographical and social conditions), not only because there is no question about the deaf-mute's creed in the forms mentioned on p. 374, but also because by far the greater majority of Danes are Lutherans, the figures for the confessors of the other religions being therefore exceedingly small. There were thus in 1880 only about four thousand Jews living in Denmark. Amongst these there were—according to special investigations performed by me—altogether four deaf and dumb individuals, which must be considered as a comparatively high rate.

IV.—AGE (AND MORTALITY) OF DEAF-MUTES.

The distribution of deaf-mutes in the different periods of age is shown by Table IV.

TABLE IV.—DISTRIBUTION OF DEAF-MUTES BY PERIODS OF AGE.

PERIODS OF AGE.	TOTAL NUMBER OF DEAF-MUTES.	NUMBER OF INDIVIDUALS IN GENERAL PER 1,000 OF LIVING POPULATION.	
		NUMBER OF DEAF-MUTES PER 1,000 DEAF-MUTES.	NUMBER OF DEAF-MUTES PER 1,000 DEAF-MUTES.
Under 15 years.	420	334.7	337.9
15-20 "	167	133.1	89.8
20-40 "	350	286.1	285.0
40-60 "	211	168.1	161.5
60 and over.	93	74.1	95.8
Age Unknown.	5	4.0	
Total.	1,255	1,000.0	1,000.0

According to the above there were in 1886 *comparatively as many individuals in the deaf-mute population under 15 and between 20-40 years of age as in the rest of the population, whilst there were comparatively a greater number in the period of age between 15-20 and fewer in the older periods.* It must, however, be called to mind that there are in reality a greater number of deaf-mutes under 15 years of age than stated above, as a number of deaf-mutes between 1-8 years of age are not registered from reasons already mentioned. There seems to be a difference in the numerical strength of the deaf-mutes and the rest of the population in the various periods of age, the cause of which it is of great interest to discover.

It must be especially pointed out that, *whilst the numerical strength of each period of age fluctuates but slightly in the whole population in course of years, this is not the case in the deaf-mute population, as will be seen by Table v.*

TABLE V.—DISTRIBUTION OF DEAF-MUTES BY PERIODS OF AGE.

PERIODS OF AGE.	TOTAL NUMBER.		NUMBER PER 1,000	
	1886	1880	1886	1880
Under 20	587.	533.	467.7	428.8
20-40	359.	413.	286.1	322.3
40-60	211.	207.	168.1	166.5
60 and over	93.	88.	74.1	70.7
Age unknown	5.	2.	4.0	1.6
Total	1,255.	1,243.	1,000.0	1,000.0

The cause of the considerable difference between the numerical strength of the deaf-mutes and the rest of the population in the different periods of age, must be sought in the fact that the number of individuals coming into and going out of the deaf-mute population in certain periods of time must be influenced by other causes than the rest of the population. Thus, the comparative numerical superiority of deaf-mutes between 15-20 which was proved in

1886, must be either explained by supposing that there was a considerable influx of individuals to the deaf-mute population in that period (which was about 15-20 years previous to the year in which the enumeration was made); or, that the mortality amongst the individuals belonging to that period of age was very low; or, finally, that *both* suppositions are correct.

The following diagram will give the best answer to the question as to an increased influx of individuals to the deaf-mute population in the period mentioned. This diagram only includes deaf-mutes *born* in Denmark, as those born outside the country only represent a purely accidental increase of the deaf-mute population. It will, however, be shown later on that the number of deaf-mutes living in 1886, and born outside of Denmark, is but very small.

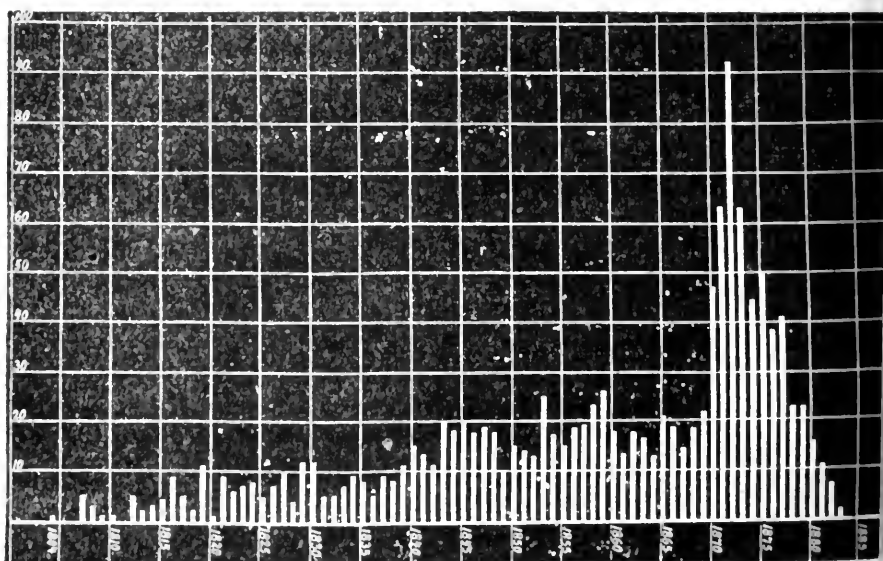


Diagram showing the number of deaf-mutes living in 1886 in (and born in) Denmark, arranged according to their birth-year. The height of the perpendicular lines, expressed in Millimeters, represents the total number of deaf-mutes born in each year.

Before drawing conclusions from the diagram just given, it must be remembered that the last six or eight lines give no reliable idea of the strength of the periods of age in

question, for (as before mentioned) many deaf-mutes are not registered before the age of school is reached, which in Denmark is eight years. Further, it must be observed that a similar diagram, embracing the whole population, would give a series of vertical lines, the height of which would decrease pretty regularly, from right to left. The diagram given here, on the contrary, shows a number of vertical lines, which it is true decrease gradually from right to left, but do so extremely irregularly. For instance, the two lines which respectively represent the number of deaf-mutes born in 1830 and 1864 (and living in 1886) are about equal in height. *Especially remarkable is the sudden and considerable rise in 1870-1874, culminating in 1872*, so considerable indeed that accidental causes are put entirely out of the question.

The supposition that an unusually large number of deaf-mutes were born in the years 1870-75 cannot be received as an explanation of the considerable increase of deaf-mutes born in those years, as it is hardly possible to imagine that causes productive of congenital deaf-mutism would be considerably more active at some times than others. Therefore, the reason must be solely sought in the circumstance that the causes of acquired deaf-mutism have been accumulated in the years in question. As epidemic diseases are the principal cause of acquired deaf-mutism, it is reasonable to suppose that epidemics of diseases which experience has proved to cause deaf-mutism, have prevailed in Denmark in 1870-75 and the years immediately before and after. As according to experience gained in Denmark and elsewhere, scarlet fever, measles, and typhoid (enteric) fever play an important part in the etiology of acquired deaf-mutism, it will be of interest to ascertain whether one or more of these diseases have been prevalent in Denmark during the period in question.¹

¹ It must be borne in mind that only a small minority of the deaf-mutes living in 1886 were reported on forms which contain information as to the cause of their deafness, and that therefore the question discussed here cannot be solved by an elaboration of these forms. This is, of course, a drawback of the Danish method of having two different forms for the registration of deaf-mutes, the numerous advantages of which is otherwise evident.

An answer to this question is to be found in the official Danish medical reports of these years. According to these, the following number of individuals were attacked by scarlet fever in 1870-1875,¹ the previous and subsequent five years being also given for comparison :

TABLE VI.—CASES OF SCARLET FEVER REPORTED,
1865-1880.

1865	1866	1867	1868	1869	1870	1871	1872
5,857	8,081	5,885	3,414	7,339	8,607	6,736	3,862
1873	1874	1875	1876	1877	1878	1879	1880
2,214	1,332	4,444	8,047	9,015	7,150	7,385	8,116

Table VI. shows, it is true, that scarlet fever was pretty prevalent during a certain period, and that it may have produced an increase in the deaf-mute population in 1870-1875. But, at the same time, the epidemic was not especially prevalent in the years 1872-1875, during which it might be expected to be unusually severe, if it is to be considered as the cause of the remarkably sudden increase of deaf-mutes born in 1872, scarlet fever being most injurious to the organs of sound during the first years of childhood. It will also be observed that the great frequency of scarlet fever in 1865-1867 had no influence upon the increase of the deaf-mute population, which just in these years is very slight.

According to the above it would appear that *scarlet fever although it may have influenced the rise in 1870-1875, has scarcely been an important cause of the sudden increase in 1872.*

The Medical Reports furnish the following information as to the prevalence of measles during the period in question :

TABLE VII.—CASES OF MEASLES REPORTED, 1865-1880.

1865	1866	1867	1868	1869	1870	1871	1872
2,988	6,322	3,830	2,980	11,557	6,042	2,044	3,529
1873	1874	1875	1876	1877	1878	1879	1880
11,617	10,928	8,417	1,502	1,802	1,648	21,729	16,468

¹ In Denmark compulsory notification of infectious diseases is incumbent upon every medical practitioner, and medical and surgical practice is only open to qualified medical men.

According to Table VII., measles were especially prevalent in Denmark in the years 1873 and 1874, at a time when they may have been a cause of the increase in the deaf-mute population. It must, however, be observed that the great increase in the deaf-mute population in the years in question falls principally to the share of certain districts in the Jutland in which measles appeared in 1873 and 1874 in a purely sporadic form. As the great prevalence of measles in 1879-1880 can hardly have influenced the increase of deaf-mutism in 1870-1875—acquired deaf-mutism being proved by experience to be most frequent between one and four years of age¹—the conclusion arrived at is, that *measles cannot be considered as having had any great influence upon the great increase in the deaf-mute population in 1870-1875.*

As far as typhoid (enteric) fever is concerned it must be observed that up to 1876 gastric and typhoid fever were reckoned as one in the Danish medical returns. Consequently, when comparing the lists before and after that year, the figures giving the number of cases in each disease must be added together after 1876.

TABLE VIII.—CASES OF TYPHOID (AND GASTRIC) FEVER REPORTED 1866-1880.

1865	1866	1867	1868	1869	1870	1871	1872
13,540	11,523	8,158	17,300	11,009	11,058	11,114	12,353
1873	1874	1875	1876	1877	1878	1879	1880
11,075	12,146	14,495	15,826	12,775	14,664	13,341	12,660

It would thus appear that *typhoid fever was not especially prevalent in Denmark during the period in question.*

The question thus remains, what was the influence of epidemic cerebro-spinal meningitis upon the deaf and dumb population in the years 1870-1875? The importance of this disease in acquired deaf-mutism has not, up to the present, as above mentioned, been acknowledged in Denmark. BREMER writes thus in 1880: "This disease is of no importance as far as Denmark is concerned, having hardly ever

¹ A. HARTMANN, *loc. cit.*, p. 75, and H. SCHMALTZ, *loc. cit.*, p. 1, who state respectively the first to third years and first four years of childhood.

appeared in this country. Diseases of the membranes of the brain must be considered as amongst the most rare causes of deaf-mutism in Denmark." ¹

Epidemic cerebro-spinal meningitis is, however, known to have appeared as an epidemic in Denmark in 1844-1848, and 1872-1875. A glance at the diagram, page 384, will show that the increase of the deaf and dumb population was especially considerable during these two periods, and in the first period one year, and in the second two years previously. The increase during the period first mentioned is so considerable that a greater number of deaf-mutes living in 1886 were born between 1843-1848 than in the corresponding number of years 1864-1869; and not less than 369 individuals, *i. e.*, more than one fourth of the total number of deaf-mutes living in 1886, were born 1870-1875. This cannot but give rise to the supposition that *epidemic cerebro-spinal meningitis plays an important part in the present prevalence of deaf-mutism in Denmark*—a supposition which is strengthened by a consideration of the number of deaf-mutes born at certain periods in certain districts of Denmark when the disease has been especially prevalent. This will be more particularly treated in the following.

It must, however, be distinctly remembered that the results gained and the suppositions brought forward above are only correct on the presumption that the numerical superiority of certain periods of age, when present, is due to a greater increase of the deaf and dumb population in those years, and not to a less mortality. In other words, it has been assumed in the above that the mortality amongst the deaf-mute population has been evenly distributed over the whole period embraced in these investigations.

This leads us to the question of the mortality of the deaf-mutes—a question which cannot be solved as in the case of the general population (where the comparison between the numerical strength of the different periods of age gives the necessary information), the reasons having been mentioned above.

¹ *On the Pathological Changes Found in Deaf-Mutes*, Copenhagen, 1880, pp. 145 and 146.

It will easily be understood that it is impossible to obtain information as to the mortality of deaf and dumb children under 8 years of age. As far as the period of 8-16 years is concerned, a small, but valuable, paper by the late Rev. MALLING-HANSEN¹ throws a strong light on the mortality of deaf and dumb children in Denmark. According to MALLING-HANSEN'S investigations, 31 per cent. of the inmates of the Royal Deaf and Dumb Institution in Copenhagen died during their stay there during the years 1824-1839, *i. e.*, almost one third of all the inmates. During these sixteen years there were on an average 85 inmates each year; out of those, on an average, 5 died, the yearly death-rate being thus not less than 6 per cent. During the following thirty years (after the present building was taken into use in 1839), from 1840-1869, the mortality decreased considerably, only 14 per cent. of the total number of inmates dying during their stay in the institute. The average annual number of inmates being 107, and the average numerical number of deaths 27, the annual death-rate was 2.5 per cent. during this period. In the decade 1870-1879 the mortality of the inmates decreased so considerably that only 2 per cent. of the inmates died in the institute. The average annual number of inmates being 123 in this period, and the average annual number of deaths being 0.4 per cent., the yearly death-rate had consequently been reduced to 0.3 per cent., while the mortality rate of normal children in the same period of age as the deaf-mute inmates is nearly double as large, *viz.*, 0.6 per cent. This result certainly tends to prove that *the mortality rate is not less favorable amongst deaf and dumb children than amongst normal children, when the former live under good sanitary conditions.* There is therefore reason to presume that the unfavorable mortality reported from deaf and dumb institutions, especially formerly, is caused by the circumstance that the deaf and dumb children have lived under bad sanitary conditions, which, it is certain, was formerly the case in the Royal Deaf and Dumb Institution in Copenhagen.

¹ *On the Mortality Amongst the Females of the Royal Deaf and Dumb Institution in Copenhagen during the Period of 1824-1879.* Copenhagen, 1880.

As a base in computing the mortality amongst deaf and dumb individuals over twenty years of age, are used all the returns furnished on Form II. of deaf-mutes from the decade 1879-1888. The results are condensed in Table IX., where is also found for comparison the number of deaths to be expected in each period of age, and corresponding to the same number of individuals, according to the calculations made by TH. LÖRENSEN in the working population of Copenhagen,¹ and by RUBIN and WESTERGAARD, in the class of cottagers without land in the rural districts of Fünen.² These two classes are chosen because—as will be proved later on—the conditions of the deaf-mute population in general are very similar to those of the classes mentioned.

TABLE IX.—NUMBER OF DEATHS AMONGST DEAF-MUTES
COMPARED WITH THE NUMBER OF DEATHS IN
OTHER SOCIAL CLASSES.

Period of Age.	MALES.				FEMALES.			
	Number of living deaf-mutes.	Annual number of deaths amongst deaf-mutes.	Number of deaths to be expected amongst the working classes.	Number of deaths to be expected amongst cottagers without land.	Number of living deaf-mutes.	Annual number of deaths amongst deaf-mutes.	Number of deaths to be expected amongst the working class.	Number of deaths to be expected amongst cottagers without land.
20-25 years.	435	—	3	3	458	10	3	3
25-35 "	902	14	0	4	831	27	6	6
35-45 "	798	10	15	4	674	15	9	6
45-55 "	398	23	14	3	410	14	6	4
55-65 "	362	15	23	2	299	7	11	5
65-75 "	187	13	20	10	179	2	14	9
75 years and over	29	6	6	13	57	6	11	22
Totals	3,111	90	90	45	2,809	81	62	55

¹ *Influence of Economical Conditions and Trade on Mortality.* Copenhagen, 1884, p. 13.

² *The Mortality of the Rural Population in the Diocese of Fünen.* Copenhagen, 1886, p. 82.

It will be seen from Table IX. that a comparison between the number of deaths amongst male deaf-mutes in each period of age and the number of deaths to be expected according to the computation of mortality amongst cottagers without land—a social class to which a large number of Danish deaf-mutes belong by birth, or to whose social position their own frequently corresponds, the majority of deaf-mutes in Denmark belonging to the poorer rural classes—shows that *a considerably greater number of deaths have occurred amongst the male deaf-mute population within the period mentioned than one might have expected*, and that this circumstance is principally owing to a *relatively high mortality in the periods of age 25-65*. It must, however, be remarked that the results obtained by RUBIN and WESTERGAARD are based upon investigations made in rural districts with an exceptionally favorable mortality. Further, it will be seen from Table IX. that the number of deaths amongst male deaf-mutes is exactly the same as might be expected from the death-rate of the male working classes of the metropolis, and the difference found in the different periods of age is not greater than might be explained by accidental causes on account of the small material used. If, then, one may presume that the returns used really embrace all the deaf-mutes of the country, and that the annual decrease in the number of deaf-mutes is caused by deaths (about which there can hardly be any doubt, as very few deaf-mutes emigrate from the country), it will be seen that *the mortality-rate amongst adult male deaf-mutes corresponds exactly to that of the social class which, according to experience made in this country, has the highest death-rate* (compare TH. LØRENSEN, *loc. cit.*, p. 18 a. o.).

A comparison made between the computed and expected number of deaths amongst the adult female deaf-mute population on the one side and the adult females of the cottager class on the other side also shows a considerably higher death rate amongst the deaf and dumb adult females than might be expected. A comparison with the death-rate of adult females of the working classes in the metropolis shows, strangely enough, a much greater difference, principally

caused by a high mortality rate amongst female deaf-mutes from twenty to twenty-five years of age. This might, however, be explained by the fact that the female working classes of Copenhagen embrace a considerable number of female servants, whose death-rate, according to TH. LÖRENSEN, is especially favorable. This author found that the difference between the actual number of deaths and the number of deaths to be expected amounts to 66 per cent. This fact, however, does not sufficiently explain the great number of deaths amongst deaf and dumb females from twenty to thirty-five years of age, and there is, therefore, every reason to believe that *the mortality rate amongst young deaf and dumb women is really comparatively very high.*¹ The cause of this phenomenon can hardly be explained satisfactorily at present.

On the other hand, it seems as if *the mortality rate of deaf-mutes of the older periods of age, and especially of females, is less unfavorable during the period examined*; the figures are, however, too small to give reliable results. This does not in any way disagree with the results gained by Table IV., which showed a numerical weakness in the older periods of age of the deaf-mute population compared with the same periods of age in the general population; for it is very likely that it is caused by the circumstance mentioned before, *viz.*, that the deaf-mutes some fifty or seventy years ago lived under very bad sanitary conditions, when inmates of the Royal Deaf and Dumb Institution of Copenhagen, the only institution existing then. It is therefore probable that many of those inmates who escaped death from consumption during their stay there (consumption being the most frequent cause of death), left the institution with the germ of tuberculosis, thus extenuating the periods of age to which they belonged.

The high death-rate of the Danish deaf-mute population proved to exist at present and formerly is hardly caused directly by deaf-mutism itself, but can naturally be explained by the unfavorable social and sanitary conditions under which this population lives. The investigations mentioned

¹ This view is strongly corroborated by the results obtained by UCHERMANN in Norway, who recently had come to exactly the same result.

above tend to prove, anyhow, that deaf and dumb individuals, when living under good sanitary conditions, do not exhibit a higher mortality than normal individuals.

V.—DISTRIBUTION OF DEAF-MUTES IN TOWNS AND RURAL DISTRICTS.

In order to obtain information as to the distribution of deaf-mutes in different parts of the country, one ought to divide the deaf-mutes according to their *birthplace*, and not, as in most statistics, according to their place of residence. It is evident that the congregating of deaf-mutes in deaf and dumb institutions and asylums and—after their dismissal from these—in their neighborhood, necessarily causes such places to appear with a high deaf-mute rate, in case this is computed by comparing the number of deaf-mutes residing in such places with the number of inhabitants, while a division of deaf-mutes according to their birthplace has this advantage, that not only a survey is obtained of the places and districts where the comparatively greatest number of deaf-mutes are born, but also of the places and districts where the greatest number of cases of acquired deaf-mutism occur. It is a fact, namely, that individuals who acquire deaf-mutism after birth generally do this while living in their birthplace, because acquired deaf-mutism generally occurs during the first years of infancy, and because parents with young children do not, as a rule, leave their place of residence. In any case, experience made in this country has proved that deaf-mute children do not, as a rule, change their place of residence before being sent to an institution.

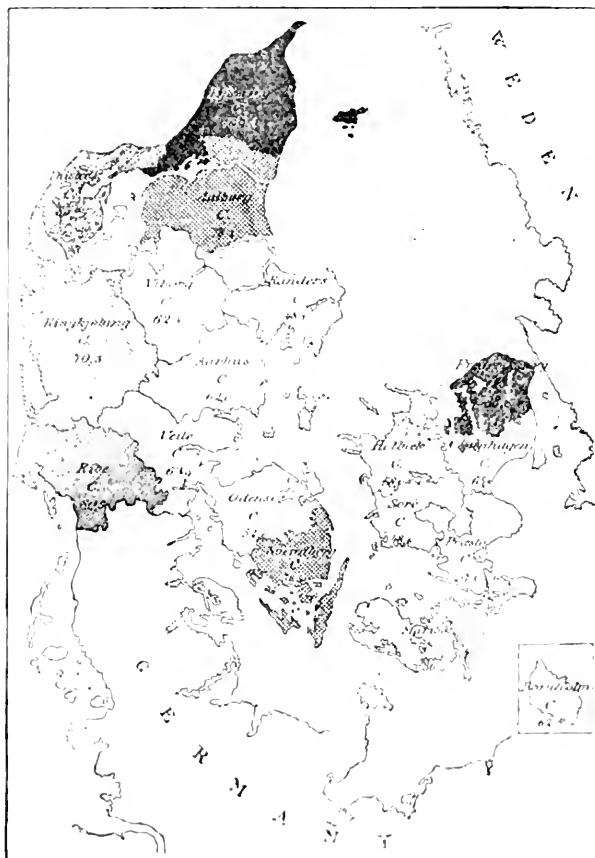
The deaf-mutes living in the country in 1886 were distributed according to their birthplace in the following way:

Born in the metropolis	122
“ “ provincial towns	150
“ “ rural districts	957
“ “ dependencies	9
“ outside the country	17
Total	1,255

According to these figures there were in the metropolis 45.0, in the provincial towns 53.4, and the rural districts 67.5

deaf-mutes per 100,000 inhabitants living in the respective places.

It seems, therefore, that deaf-mutism is least prevalent in the metropolis, and most prevalent by far in the rural districts. The latter, viz., that deaf-mutism is more prevalent in the



rural districts than in towns, is stated as a fact by nearly all statisticians since mentioned by WILDE as valid for Ireland.¹ I shall, however, be able to prove that this, at least as far as Denmark is concerned, is only apparent. For if the population of Denmark is divided into three groups,

¹ *Practical Observations on Aural Surgery*, p. 474.

viz., those born in the metropolis, those born in the provincial towns, and those born in the rural districts, *i. e.*, the same three groups as the deaf and dumb population was divided into, the result is (census 1880) that out of 100 inhabitants born in Denmark

8.69	12.46	78.85
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were born respectively in the metropolis, the provincial towns, and the rural districts, while the corresponding figures for 100 native (Danish born) deaf-mutes were

9.93	12.20	77.87.
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Considering how small the deaf and dumb population is compared with the whole population, it is evident that accidental causes easily exercise some influence, and the difference in the two rows of figures is, therefore, certainly not greater than can be explained by accidental causes. The figures thus prove that *the greater distribution of deaf-mutism amongst the rural population than amongst the town population, and the greater prevalence of deaf-mutism in provincial towns than in the metropolis is only apparent*. The cause of this apparent greater prevalence of deaf-mutism in the rural districts than in the towns, which formerly has been somewhat difficult to explain satisfactorily, is—at least in Denmark—to be sought in the circumstance that the towns, and especially the large towns, now-a-days exert a great attraction on the rural population, which to a great extent immigrates from the rural districts into the towns. Now as the deaf-mute rate of the rural districts is computed, either by comparing the number of deaf-mutes *born* there with the number of inhabitants residing there, *i. e.*, the inhabitants left after the emigration, or by a comparison of these latter with the number of deaf-mutes *residing* there, who, however, according to experience, do not show a great tendency to leave their birthplace, it is evident that the rate of the rural districts necessarily must be too high. On the other hand, the circumstance that the population of the towns, and especially of the metropolis, to a great extent is augmented by immigration, must cause its rate to be too low.

The share which the Danish *provincial towns* furnish to the deaf and dumb population is comparatively evenly dis-

tributed over the different decades of the century. The share of each town does not stand in proportion to the size of the town, the largest ones sometimes being the birthplace of very few deaf-mutes, and *vice versa*. It must, however, be borne in mind that the Danish provincial towns are all very small (only seven towns having from 10,000 to 33,000 inhabitants), and that consequently the figures of the present material are very small.

The share the Danish metropolis, Copenhagen, has furnished to the deaf and dumb population is, on the contrary, very unevenly distributed over the different decades of the century, there being for instance amongst the deaf-mutes living in Denmark in 1886 a less number born in the metropolis in 1860-1869 than in 1840-1849, and the last decade, 1870-1879, showing a very abrupt increase. I shall not go into details as to the investigations made to ascertain the causes of these circumstances, but state that the figures here also are so small in each decade (Copenhagen having at present, the suburbs included, 375,251 inhabitants) that accidental causes easily assert themselves, but it is very probable that epidemics of scarlet fever and cerebrospinal meningitis have been important factors.

The share the various *rural districts* have furnished to the deaf and dumb population is very different, the deaf-mute rate varying from 36.9 (Alaribo County)¹ to 109.0 (Hjörning County) per 100,000 inhabitants, as seen by the accompanying map. The causes of these great differences shown by this map to be present in Denmark have been investigated by me, and the results laid down in another paper, to which I must refer the reader for details ("Distribution of Deaf-mutism in Denmark," *Hospitals Tidende*, 1890, No. 12 and 13.) I shall here only briefly mention that *there is no evidence of deaf-mutism being endermic in any place in Denmark, but that the difference between the various rural districts must be principally attributed to epidemic causes, and especially that the high rate of the northern and western districts of Jutland*

¹ Denmark is divided into eighteen counties ("Amter"), each one having on an average about 80,000 inhabitants in the rural districts, while the number of urban inhabitants naturally varies.

must be attributed to recent epidemics of cerebro-spinal meningitis. Further, there seems to be a strong connection between the deaf-mute rate and the fertility of the districts in as much as *the rural districts most heavily burdened with deaf-mutism are on the whole the least fertile and thinnest populated districts in Denmark*, while, on the other hand, most of the districts with a low deaf-mute rate belong to the most fertile and most densely populated districts. The fact that the most thinly populated districts on the whole are most heavily burdened with deaf-mutism is not incongruous with the fact that the high deaf-mute rates are principally caused by epidemic influences, but can easily be explained by the fact that epidemic diseases make the greatest havoc in districts where the population lives under bad social and sanitary conditions, with long distances to medical aid, etc.

It has finally to be mentioned that the place the deaf-mute rate of the various rural districts occupies in the series undoubtedly varies in the course of years. This I had occasion to illustrate at the last International Medical Congress in Berlin, exhibiting a map illustrating the distribution of deaf-mutes in Denmark in 1850. A comparison of this map with the one accompanying the present paper showed that *several rural districts which now exhibit a high deaf-mute rate, formerly did not do so, and vice versa.* This fact is, of course, closely connected with the facts mentioned above, *viz.*, that the deaf-mute rate is to a great extent influenced by epidemic diseases.

VI. SOCIAL POSITION OF THE DEAF-MUTE.

The social position of an individual does not, as a rule, depend only upon matters concerning the individual himself, but also upon the conditions under which his ancestors, and especially his parents, have lived. This latter circumstance is of special importance when the individual in question is deaf and dumb, because deaf mutes are so heavily weighted in the race of life that they stand but little chance to rise above the social strata in which they are born. On the other hand, the deaf-mute is not likely to sink consider-

ably lower in the social scale, as in most civilized countries he is cared for both by public and private charities.

The questions Nos. 1 and 2 of Form I. (see Appendix) are able to throw a light on the conditions under which the deaf-mutes in Denmark are born. There were altogether 553 returns containing answers to those questions dealing with the social positions of deaf-mutes' parents and their social condition. As, however, several of these returns applied to brothers and sisters, the number of fathers to deaf-mute offspring was less, *viz.*, 496 men. Amongst these, 154 were "cottagers,"¹ with some land or without any at all, 80 were "farmers" or "lot-owners,"¹ 71 were laborers, 34 were "tenant-cottagers,"¹ 11 servants on farms, 9 millers, 9 carpenters, 9 joiners, 8 fishermen, 8 shoemakers, 7 smiths, 6 tailors, etc., etc.

As nearly three fourths of the Danish population are rural, it is not to be wondered at that *the majority of Danish deaf-mutes belong by birth to the agricultural population*. It will, however, be remembered that the rural population of Denmark does not furnish a relatively greater share to the Danish deaf and dumb population than the urban.

The circumstance that a great majority of the Danish deaf and dumb mutes belong by birth to the rural population, must, as a matter of course, produce the result, that a comparatively great portion of the Danish deaf and dumb population takes a social position marked by the circumstances characteristic to the rural population,—provided that the deaf-mutes born in the rural districts do not for some reason or another in a marked degree emigrate from

¹ The rural population of Denmark belongs principally to the agricultural class which consists of the following classes: (1) The "farmer" (*gaardmanden*) either freeholder or tenant with, as a rule, from 2 or 3 to 6-8-10 *Tonder Hartkorn*, a *Tonde Hartkorn* being the Danish standard of land-tax indicating the quality of the soil, there being on an average 10 *Tonder Land* (1 *Tonde Land* = 5,516 square metres) to 1 *Tonde Hartkorn*; (2) the "lot-owner" (*Afbyggeren*, *Parecollisten*, *Boelsmanden*) with 1-3 *Tonder Hartkorn*; (3) the "freehold-cottager" with land (*den jordbesiddende Højsmand*) with $\frac{1}{2}$ -5 *Tonder Hartkorn*; (4) the "freehold-cottager" without land (*den jordløse Højsmand*), who only owns the site of his cottage, and, as a rule, a small garden; (5) the "tenant-cottager" (*And idderen*, *Levshøjsmanden*, *Arbjderen*) who neither owns cottage nor land. (See also *Denmark: its Medical Organization, Hygiene, and Demography*, Copenhagen, 1891, pp. 137, etc.)

the rural districts, for instance, because they more easily find occupation or support in towns, etc. Experience proves, however, that only 36 out of the 957 deaf and dumb individuals born in the rural districts, *i. e.*, only 3.76 per cent., had emigrated to the metropolis and had there their place of abode, and only 58, *i. e.*, 6.06 per cent., had emigrated to the provincial towns (the inmates of the deaf and dumb institutions not included). *This shows a movement of the deaf and dumb population from the rural to the urban districts, which is almost exactly like that of the whole population,* the corresponding figures of which were in 1880, 3.54 and 6.93 per cent. Accordingly, it will be seen that the attraction of the metropolis to the deaf and dumb population is not so considerable as might be expected—and as has been feared—on account of the great majority of deaf-mutes having been, up to quite recently, instructed here, and on considering that special measures are taken here to support and assist deaf-mutes (societies, homes, etc.). Dr. UCHERMANN has pointed out the same fact in Norway, where, in 1885, 86.3 per cent. of the deaf-mute population were born in the rural districts, while as many as 76.8 per cent. resided there. There was in Norway likewise no particular rush of deaf-mutes to the metropolis.¹

Further it has to be added that the rural (and consequently also the agricultural) classes predominate somewhat in the returns used as material for the present investigation, because—as stated by a special calculation—some 30 to 40 returns concerning deaf-mutes “not previously reported” from Copenhagen are missing, the returns from the metropolis, the provincial towns, and the rural districts representing respectively 4.25, 13.12, and 82.63 per cent. of the total returns, while, as mentioned before, the mutual numerical strength of these three groups of deaf-mutes from these three parts of the country is as 9.93, 12.20, and 77.87 per cent. This is caused by the circumstance that the deaf-mutes of the metropolis are reported on special forms and,

¹ *Information for the Ecclesiastical Committee as to some Circumstances relating to the Appearance of Deaf-mutism in Norway*, pp. 9 and 11.

as a rule, not reported on Form I. (see Appendix) until they are admitted to the deaf and dumb institutions, while the deaf and dumb children residing in the rural districts are frequently reported before.

The conditions under which the parents of deaf and dumb children live might be stated by means of question No. 2 of the Form I. The answers to this question vary, however, considerably, and it is, therefore, difficult to give a survey of these matters. I have endeavored to divide the social conditions into four classes, with the following result shown in Table X.:

TABLE X.—SOCIAL CONDITIONS OF DEAF-MUTES' PARENTS.

Wealthy.....	5	individuals, <i>i. e.</i>	1.0	per cent.
Good conditions.....	92	" "	16.6	"
Very moderate conditions.....	311	" "	56.2	"
Poverty.....	130	" "	23.5	"
Indistinct or no answers.....	15	" "	2.7	"
<hr/>				
Total.....	553	" "	100.0	"

We are, however, totally in lack of any material from other groups of abnormal individuals with which to draw comparisons, and there will, therefore, be no necessity for further remarks.

Finally, when mention is made that 27 of the 553 deaf and dumb individuals, *i. e.* 4.9 per cent. were born illegitimate, all the information as to the conditions of the Danish deaf-mutes is given as far as their birth is concerned. The results gained in the above seem all to point out that *the deaf-mutes of Denmark to a great extent belong by birth to those classes of society which are least favorably situated economically as well as socially*—a result also gained in Saxony through the investigation of H. Schmaltz.

After having in the previous pages thrown light on the conditions of the Danish deaf-mutes as far as these are connected with the position and conditions of their ancestors, and with their place of birth, I will, in the following, deal with the circumstances applying to the person of the deaf-

mute, inasmuch as these are caused directly or indirectly by the deficiency of the deaf-mute.

As far as the education and instruction of the Danish deaf-mutes is concerned, there were altogether 575 returns concerning adult deaf-mutes "who had been previously reported" for the year 1886. By adult deaf-mutes is here understood deaf-mutes discharged from the deaf and dumb institutions, or confirmed, or if not belonging to any of these categories, over sixteen years of age. As the returns for the metropolis differ from those from the provincial towns and the rural districts these are not included here. Of these 575 returns (concerning 297 men and 278 women) 59 contained insufficient or unclear answers of the questions concerning education and instruction. Of the 516 left, 47, *i. e.*, only 9.1 per cent. were educated and instructed in their names (license to be instructed at home being given by the Ministry of Educational Matters, where a sufficient guarantee of proper instruction is given). Thirty-one deaf-mutes, *i. e.*, 6.0 per cent. had not received any instruction at all, in the majority of cases because—as far as could be seen—the deaf-mutes in question were mentally so deficient as to render their instruction impossible. In some cases, the reason, however, was undoubtedly, that the parents had a prejudice against the compulsory report and instruction of deaf-mutes. Four hundred and thirty-eight deaf-mutes, *i. e.*, 84.9 per cent. were reported to have been instructed in one of the deaf and dumb institutions, which are all public or under public control. This shows a rate of instructed deaf-mutes which is hardly higher in any other country. As an example may be mentioned, that WILHELM in the Regierungsbezirk Magdeburg found amongst 519 deaf-mutes (of whom, however, 44 were under the age of instruction) only 292 who were or had been instructed in a deaf and dumb institution.¹

When the deaf and dumb children are called to attend the instruction given by the State, they are divided first into two classes, *viz.*, (a) those with deficient intelligence approaching more or less to idiocy, and (b) whose intel-

¹ "Statistik der Taubstummten des Regierungsbezirkes Magdeburg nach der Volkszählung von 1871." *Beilage zu Deutschen Klinik*, 1873, p. 84.

ligence does not show any abnormality, the division being made by means of the returns, (Appendix, Form 1) mentioned above. The first class of deaf-mutes are sent at once to (1) a special *institution in Copenhagen*, where they are instructed during the following eight years in a way adapted to their low intelligence. All the other deaf and dumb children are sent to (2) a *preparatory school in Fredericia*, adapted to receive 70 children, who receive here a preparatory instruction during one year, divided into seven different classes. After having been here one year, the inmates are divided into two different groups: (a) Those who are totally deaf and dumb, and (b) those who are only partially deaf, or partially dumb (in the latter case because they either are only partially deaf, or because they have become deaf in a comparatively advanced age). The second group (*viz.*, those only partially deaf or dumb) are sent to (3) the new *institution in Nyborg*, which can give room to altogether 135 inmates; these deaf and dumb children are instructed, by means of lip-reading and oral speech, during the following seven years. The first group (*viz.*, those totally deaf and dumb) is subdivided into (a) those whose intelligence or faculty of language is so little developed, that they are not able to learn oral speech, and these are sent to (4) a special *institution in Copenhagen*, adapted to contain 90 inmates, who are instructed by means of dactylogy; and (b) those who are able to learn oral speech. This latter group of totally deaf and dumb children are transferred to (5) a special *institution in Fredericia*, where they are instructed by means of oral speech and lip-reading, being, however, on account of their number, instructed in two different parallel-classes, named the A-classes and the B-classes, the latter containing those with the lower degree of intelligence. This institute in Fredericia is adapted to instruct 190 deaf and dumb children. In all the institutions the instruction lasts eight years (the one year in the preparatory school included), and the inmates are all confirmed here after the end of their instruction. In the two institutions where oral speech and lip-reading are taught, the elder inmates are lodged outside of the institution in private families to accustom them to have intercourse with hearing individuals. All the inmates leave the institution educated in some practical trade, the girls being especially instructed in needlework, while the boys are educated chiefly as tailors, bootmakers, or joiners. The annual payment for each child is at present 280 kroner (18.16 kroner = £1), the payment in case of poverty of the parents being met by the respective county or town, to which the child belongs. Besides these public institutions, there is one small private school in Copenhagen: *Miss Mathisen's private school* for the education of deaf and dumb children of the better classes. In 1889 there were altogether 405 children instructed in the different institutions for deaf and dumb; of these 26 were instructed by means of gesture language (all these having an intelligence approaching more or less to idiocy), 75 by means of dactylogy, and 304 by means of oral speech and lip-reading. The yearly expense of the State towards the instruction of deaf-mutes amounts to about 153,000 kroner.

The confirmation of the deaf-mutes must be considered as being in close connection with their instruction, in as much

as the fact that an individual is confirmed, or not, is an expression of his mental development during puberty, and of the result of the instruction received. Amongst the 575 adult deaf-mutes mentioned above, there were thirteen about whom no information could be obtained. Of the 562 remaining deaf-mutes 515, *i. e.*, 91.6 per cent. were confirmed, and about 8.4 per cent. there was a decided answer in the negative. This latter circumstance has in some cases been undoubtedly caused by the parents of the deaf-mute having withdrawn the child from any instruction whatever, but in the majority of cases the reason has undoubtedly been that the deaf-mute concerned has been mentally deficient. As it will be remembered, deaf and dumb idiots are not included in the present investigation, and there is, therefore, every reason to consider the number of deaf-mutes which have not been confirmed as comparatively considerable. This would decidedly tend to prove that deaf-mutism not unfrequently is accomplished by mental deficiencies—a fact which several pedagogues have laid great stress upon as the result of their personal observations, and which, in all probability, is connected with the fact that deaf-mutism is frequently caused by cerebral diseases.¹

Amongst the external conditions which also narrow the limit within which the social position of the deaf-mutes is confined, must be mentioned their education in public institutions. The circumstances must necessarily produce a certain uniformity in the development of the deaf-mutes, as these institutions, as a matter of course, must be organized to give education and instruction adapted to the average type of deaf-mutes. This will naturally be to the disadvantage of those deaf-mutes who are considerably over the average of mental ability. This fact has in Denmark led to the classification of deaf-mutes, so that each deaf-mute receives an instruction as nearly as possible adapted to his faculties; but still even the more gifted deaf-mute will have greater difficulties to gain a prominent position than a

¹ See also HARTMANN, *loc. cit.*, p. 14.

normal individual, unless instructed by special teachers—a thing which only the wealthiest people can afford to give their deaf and dumb children.

An elaboration of the answers of that question on the forms which concern the social position and trade of the deaf-mute will prove that the considerations mentioned above are right. There were altogether 313 returns concerning deaf and dumb adult individuals over twenty years of age where these questions were answered distinctly. There were altogether amongst these deaf-mutes not more than *two who had a liberal profession, viz.,* two deaf and dumb teachers residing in the metropolis (not including those who, on account of means, had no occupation). *All the other deaf-mutes had been trained to live by manual labor.* No less than 236 deaf and dumb men, *i. e.*, 75 per cent., were or had been artisans; amongst these, shoemakers (96), tailors (59), joiners (37), were especially prominent. The rest were distributed throughout the various trades. Statistics from other countries (for instance, from Nassau and Norway) show the same preponderance of the same trades, a fact which is easily explained, as these trades, from various reasons, are particularly adapted for deaf-mutes.

One hundred and twenty-two returns contained information as to the occupation of deaf and dumb women: 72 women earned their living by sewing, 21 by washing, 12 were domestic servants, etc., and only one had a liberal profession, being a teacher. Out of the 278 deaf and dumb women, no less than 156 were reported either as married or as having no occupation (being principally maintained by their relations), or as being under the Board of Guardians (see below).

We shall now endeavor to discover whether the ordinary deaf-mute is able to support himself in the struggle for existence. The returns prove the sad fact that nearly half of all deaf-mutes over twenty years of age are obliged to fall back upon the help of others, as will be seen from Table XI.

TABLE XI.—ADULT DEAF-MUTES INDEPENDENT OR MAINTAINED BY OTHERS.

	MEN.		WOMEN.		TOTAL.	
	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.
Supporting themselves.....	188	67.6	96	37.5	284	53.2
Residing with relations.....	28	10.1	69	26.9	97	18.2
Supported by ".....	12	4.3	23	9.0	35	6.5
" private charity.....	11	4.0	9	3.5	20	3.7
" public charity.....	25	9.0	44	17.2	69	13.0
Inmates of workhouse.....	9	3.2	11	4.3	20	3.7
Without information.....	5	1.8	4	1.6	9	1.7
Total	278	100.0	256	100.0	534	100.0

Table XI. shows further that *there is a considerable difference between the fate of deaf and dumb men and women*, nearly two thirds of the men being able to support themselves, while this is only the case with a little over one third of the women. The number of deaf-mutes who are inmates of workhouses throws an especially strong light upon the condition of deaf-mutes, no less than 3.3 per cent. of the men and 4.3 per cent. of the women being boarded in workhouses, while the corresponding figures for the whole population are only 1.31 and 1.91 per cent. of individuals of *all* ages.

The great extent to which the deaf-mutes have to give up supporting themselves after having made their entrance in practical life shows clearly to what degree the want of hearing and speech limits the faculties of an individual. To this must also be added the circumstance mentioned above, *viz.*, that the mental faculties of deaf-mutes are frequently diminished from reasons in close connection with the deaf-mutism. When this is the case in Denmark, where the public care of deaf-mutes is especially highly developed, what must it be in other countries, where matters concerning deaf-mutes are less advanced?

Amongst the measures taken to ameliorate the sad position of deaf-mutes must be mentioned those which apply to the teaching deaf-mutes oral speech and lip-reading. It seems, however, that the energetic measures taken in Denmark in this direction, during the latter decades, have not as yet been very successful. This is shown by Table XII., from which it will be seen that *only 7.1 per cent. of the deaf-mutes who had left the deaf and dumb institutions, or who had been confined, used oral speech exclusively as their means of communication.*

TABLE XII.—ADULT DEAF-MUTES ARRANGED ACCORDING TO THEIR MEANS OF COMMUNICATION.

	Men.	Women.	Total.	Per cent.
Exclusively oral speech.....	19	22	41	7.1
Oral speech combined with other means of communication	41	44	85	14.8
Exclusively gesture-language.....	48	50	104	18.1
“ writing.....	20	11	31	5.4
“ dactylology.....	26	20	46	8.0
Combination of all three of the last-mentioned means of communication.....	132	116	248	43.1
No means of communication stated.....	11	9	20	3.5
Total	297	278	575	100.0

It will be seen from Table XII. that the majority of the Danish deaf-mutes use a combination of oral speech, gesture-language and dactylology, and gesture-language alone. Time will prove whether the erection of a new institute, in 1880, in Fredericia, and the energetic endeavors of the superintending teacher, Mr. GEORG JØRGENSEN, to teach the deaf-mutes oral speech and lip-reading, will lead to better results.

VII.—MARRIAGES OF DEAF-MUTES.

Thorough information as to this question is only to be had from the returns from the rural districts and the provincial towns, the metropolitan returns being, as it will be remembered, issued on special forms, from which it can only

be seen whether two deaf-mutes are living together as man and wife. Eighty-one out of 278 deaf and dumb males over 20 years of age, *i. e.*, 29.4 per cent. of the adult male deaf-mutes residing in the rural districts and in the provincial towns, were or had been married. As 71.6 per cent. of all males over twenty years of the entire rural population (to which, as mentioned before, the great majority of the Danish deaf-mutes belong by birth and abode) were or had been married—according to the census of 1880—it will be seen that *deaf and dumb men comparatively seldom marry. The deaf and dumb women marry less frequently. Still, only 46 of the 256 women over twenty years, i. e., 18.0 per cent., being or having been married*, while the corresponding rate of the entire female population of the rural districts was 75.0 per cent. As the total number of returns for the year 1886 contained distinct answers as to the question whether the deaf-mutes were married or not, the result is that out of 534 adult deaf-mutes no less than 407, *i. e.*, nearly three fourths of the adult deaf-mutes, were unmarried, while the number of unmarried individuals amongst the rural population only amounts to about one fourth. A comparison as to matters in other countries shows that marriages contracted by deaf-mutes are still rarer there. In the Regierungsbezirk Magdeburg, for instance, not less than 88.0 per cent of the adult deaf-mutes were unmarried¹; in the Regierungsbezirk Cologne,² 90.0 per cent.; and in the Kingdom of Prussia (in 1880)³ even 91.5 per cent. of the deaf and dumb men and 94.0 per cent. of the deaf and dumb women were unmarried; in the Kingdom of Bavaria⁴ 93 per cent. of the total number of adult deaf-mutes were unmarried.

Of the 81 married deaf and dumb men 6 were widowers, and 2 divorced. Amongst the 46 married women 3 were widows, 2 were divorced, and 1 abandoned by her husband.

The reason why comparatively so few deaf-mutes contract

¹ WILHELM, *loc. cit.*, p. 74.

² LENT: *Statistik der Taubstummen des Regierungsbezirkes Köln*. Köln, 1870, p. 20.

³ GUTTSTADT: *loc. cit.*, p. 208.

⁴ MAYR: *loc. cit.*, p. 29.

marriages must, in my opinion, be chiefly sought in this circumstance, that the men comparatively rarely attain an independent position to make a good livelihood. Besides, the position of a deaf-mute is frequently somewhat isolated—a circumstance which is a direct result of the deficiency with which the deaf-mute is afflicted. Consequently, his choice of a companion for life is, as a rule, more limited. To this must be added, as far as the deaf and dumb women are concerned, that their deficiency naturally renders them less attractive to men. It is to be expected that the position of deaf-mutes is more isolated in the rural districts and in the smaller towns, and that consequently marriages there are less frequent. This is corroborated by the fact that whilst 70 out of 534 adult deaf-mutes in the rural districts and in the provincial towns, *i. e.*, 13.1 per cent. had married each other (both husband and wife being deaf and dumb), 24 out of 100 deaf-mutes of the same age (over twenty years of age), *i. e.*, 24.0 per cent. had contracted such marriages (altogether 12 marriages).¹ The fear that marriages between deaf and dumb persons involves danger to the offspring is, even if this fear were well founded, undoubtedly of very small importance in preventing deaf-mutes from contracting marriages with each other. Experience from other spheres prove, anyhow, that the individuals in question do not, as a rule, take such regards when thinking of entering into marriage.

There were altogether in 1886, 100 marriages in the provincial towns and the rural districts where either husband, or wife, or both parties were deaf and dumb. Several of these marriages were, however, dissolved by death or separation. These 100 marriages were contracted as follows:

48	deaf and dumb men	had married	non-deaf-mute women.
35	"	"	" " deaf and dumb women.
37	"	"	women had married non-deaf-mute men.

100 marriages were contracted by 83 deaf and dumb men and 52 deaf and dumb women.

It will be seen from the above that *deaf-mutes in Denmark comparatively frequently intermarry, and especially that deaf*

¹ This information was obtained by counting how many female deaf-mutes were reported in the Copenhagen returns as being married to a deaf and dumb man under the heading of "position."

and dumb women very frequently, when contracting marriage, marry deaf and dumb men, more than two thirds of the Danish married deaf and dumb women having married deaf and dumb men. There is hardly any country in the world where deaf-mutes so frequently intermarry as in Denmark, where in 1886 the total number of such marriages (where both husband and wife were deaf and dumb) amounted to at least 47¹ per 1,255 deaf-mutes of both sexes and all ages. In Saxony there were (in 1880) 41 intermarriages between deaf-mutes, corresponding to 1,726 deaf-mutes of both sexes and all ages.² In the Regierungsbezirk Magdeburg³ there were, in 1871, only 9 such marriages, corresponding to 519 deaf-mutes; and in Ireland, in 1851, even only 5 marriages where both husband and wife were deaf and dumb, corresponding to 4,151 of both sexes and all ages.⁴ The reason why the two figures mentioned last are so small is, however, undoubtedly to some extent to be sought in the circumstance that the investigations from these latter two places are from an earlier period, and there can hardly be any doubt that the frequency of intermarriage between deaf-mutes is everywhere on the increase, as it is proved to be at present in Denmark (see further on).

As regards the *number of children born in the marriages contracted by deaf-mutes* (whether husband and wife or both were deaf-mutes), the present investigation has yielded the following results: In 3 cases there was no information as to the number of children. In the remaining 97 marriages there were born altogether 183 children, *i. e.*, on an average 1.88 child per each marriage. This seems to prove that such marriages where either husband, or wife, or both parties are deaf and dumb are comparatively but little fertile, as MYGGE⁵ has found that the average number of children in general marriages amounted to 3.65 in the Danish rural districts examined by him—a figure which approaches

¹ This figure is obtained by adding the 12 marriages in Copenhagen to the 35 marriages mentioned above.

² H. SCHMALTZ, *loc. cit.*, p. 130.

³ WILHELM, *loc. cit.*, p. 73.

⁴ WHITE, *loc. cit.*, p. 472.

⁵ MYGGE, *loc. cit.*, table iv., p. 156.

very closely that found by RUBIN and WESTERGAARD in Copenhagen.¹ Other authors have also found a comparatively small number of children born in the marriages contracted by deaf-mutes; thus, LENT found in the Regierungsbezirk Cologne² on an average only 1.75 children in each marriage of such kind, and WILHELM³ in the Regierungsbezirk Magdeburg, 2.00.

If the marriages contracted by deaf-mutes are divided into the three groups mentioned above, the result is as follows: Amongst the 48 marriages where only the husband was deaf and dumb, there was only 1 case where the number of children born was not stated; in the remaining there were born altogether 107 children, *i. e.*, on an average 2.3 in each marriage; 4 of these marriages were without any children. In the 17 marriages in which the wife only was deaf and dumb, there were altogether 38 children, *i. e.*, 2.2 in each; 3 of these marriages were without children. Of the 35 marriages where both husband and wife were deaf and dumb, there was 1 where the number of children was not stated; in the remaining 34 marriages there were altogether 38 children, *i. e.*, on an average only 1.1 child in each, and of these marriages no less than 13 were without any children. According to this, *the marriages where both husband and wife were deaf-mutes, seem to have been especially sterile*, partly because comparatively many of these were without any children, and partly because the rest of these marriages had only produced such a small number of children as will be seen from the following survey:

In 1 marriage 7 children were born; total 7 children.						
" 1	"	5	"	"	"	5 "
" 1	"	3	"	"	"	3 "
" 7 marriages	2	"	"	"	"	14 "
" 9	"	1 child was	"	"	"	9 "
" 15	"	0	"	"	"	0 "

In 34 marriages were born altogether . . . 38 children.

¹ *Statistics of Marriage, based upon the Social Strata, in Copenhagen*, Copenhagen, 1890, p. 79.

² *Loc. cit.*, p. 20.

³ *Loc. cit.*, p. 74.

In Magdeburg WILHELMI¹ found in 9 marriages when both husband and wife were deaf and dumb, 4 where no children were born, and in the remaining there were only 11 children born. H. SCHMALTZ states² that the fertility of such marriages in Saxony is considerably greater, there being at the time of his investigation 41 such marriages, in which altogether 79 children were born, *i. e.*, 1.9 child in each.

It still remains to be mentioned that 9 deaf and dumb women had borne altogether 14 illegitimate children. WILHELMI found³ 21 unmarried deaf-mute women with children, corresponding to 519 deaf-mutes of both sexes and all ages, H. SCHMALTZ 32 such women per 1,726 deaf mutes.⁴

The circumstance that a comparatively very small number of children are born in the marriages contracted by deaf-mutes, does not in itself prove that deaf-mutism directly predisposes to, or causes, a less fertility in the individuals afflicted with this deficiency. It might, namely, be presumed that there are other circumstances, in a more or less indirect way connected with the deaf-mutism of the individuals, which are the cause of the small number of children found in marriages contracted by deaf-mutes and—as stated above—especially in those marriages where both parties are deaf-mutes. As such circumstances are especially to be noted: (1) Advanced age at the contracting of marriage of husband, or wife, or both; (2) a comparatively early dissolution of the marriage by death or divorce; finally, (3) the circumstance that—from some reason or other—a great number of marriages were contracted shortly before the time of the present investigation.

In regard to the question whether deaf-mutes in Denmark marry at a more advanced age than people generally, Table XIII. gives the following results, which are compared with those gained from some rural Danish districts by RUBIN and WESTERGAARD.⁵ This comparison is of value

¹ *Loc. cit.*, p. 74.

² *Loc. cit.*, p. 139.

³ *Loc. cit.*, p. 74.

⁴ *Loc. cit.*, p. 139.

⁵ *Loc. cit.*, p. 57 and 58.

because—as mentioned several times before—the great majority of the deaf-mutes treated in this investigation belong to the rural population.

TABLE XIII.—AGE AT MARRIAGE OF DEAF-MUTES.

Periods of Age, in Years.	MEN.			WOMEN.		
	Deaf- Mutes.	Per cent.	Rural Popula- tion.	Deaf- Mutes.	Per cent.	Rural Popula- tion.
Under 20. . .	..	....	} 17.2	..	....	3.4
20-24.	10	12.9		12	26.7	29.7
25-29.	23	29.9	35.5	9	20.0	34.5
30-34.	28	36.4	21.7	10	22.2	17.1
35-44.	14	18.2	17.6	13	28.9	11.5
45 and over. .	2	2.6	8.0	1	2.2	3.8
Total.	77	100.0	100.0	45	100.0	100.0

Table XIII. shows that while the period of age, 25-29 years, is that at which the majority of men in the general rural population marry, *the majority of male deaf-mutes marry when 30-34 years of age*. This fact is easily explained by the circumstance that the mental development of deaf-mutes is somewhat slower than that of other individuals who are not deaf and dumb (their instruction for instance not beginning until they are 8 years of age), which necessarily must cause that they do not gain an independent position until at a comparatively more advanced age. As far as the *deaf and dumb women* are concerned, the table shows that *there are almost as many who marry at the age of 20-24 years as women of the general rural population who marry at the same period of age*, but that there are, furthermore, *comparatively many more deaf and dumb women who have married when 35-44 years of age than there are women who are not deaf and dumb and who have been married at this age*. This latter circumstance can hardly be explained as solely due to the same causes as mentioned for the men, but perhaps due to accidental

causes, the figures used in this investigation being somewhat small.

The influence of an advanced age at marriage on the number of the children born in the marriages contracted by deaf-mutes will, however, be more clearly demonstrated by examining the age at marriage of all the individuals who have married deaf-mutes, whether only husband or wife, or both, were deaf and dumb. The returns contained information as to 90 men (deaf-mutes and non-deaf-mutes), and 87 women (non-deaf-mutes and deaf-mutes), as will be seen from Table XIV.

TABLE XIV.—AGE AT MARRIAGE OF ALL INDIVIDUALS WHO HAVE CONTRACTED MARRIAGE WITH DEAF-MUTES.

Periods of Age, in Years.	MEN.			WOMEN.		
	Deaf-Mutes.	Per cent.	Rural Population.	Deaf-Mutes.	Per cent.	Rural Population.
Under 20. . .	..	....	17.2	2	2.3	3.4
20-24	13	14.4		24	27.6	29.7
25-29	26	28.9	35.5	26	29.9	34.5
30-34	31	34.5	21.7	17	19.5	17.1
35-44	12	13.3	17.6	16	18.4	11.5
45 and over..	8	8.2	8.0	2	2.3	3.8
Total.	90	100.0	100.0	87	100.0	100.0

Table XIV. shows that *the men who marry deaf and dumb women*—whether they are themselves deaf and dumb or not—*have a higher age when contracting marriage than men generally*, and that the figures do not differ much from those found for deaf and dumb husbands. As far as the women are concerned, Table XIV. shows that the age at marriage of the women who have altogether married deaf and dumb men—whether themselves deaf and dumb or not—is considerably lower than that stated for deaf-mute married women in Table XIII., and that the age at marriage of the former women does not differ much from that of the

whole population. This latter result necessarily reduces very much the significance of a more advanced age at marriages as a partial cause of the small number of children born in the marriages of deaf-mutes. On the other hand there can hardly be any doubt that it must have exercised a considerable influence in those marriages where the wife was deaf and dumb, and where the number of children was exceedingly small, as comparatively many of these women had married at an advanced age (see Table XIII.).

The significance of the early dissolution of deaf-mute marriages on account of premature death or frequent divorce as to the number of children born in marriages contracted by deaf-mutes is difficult to ascertain. The circumstance that the death-rate is somewhat higher among deaf-mutes of the younger periods of age, and especially among the females compared with the death-rate of the whole population, speaks somewhat in favor of the supposition that the first-mentioned cause might have been present and exercised some influence, though undoubtedly not a very great one. It does not seem, however, that there are particularly many widows or widowers among the deaf-mute population, though it must be observed that the figures in question are too small to give reliable results. On the other hand, it is beyond a doubt that the *number of divorced men and women is conspicuously high in the deaf-mute population*. Consequently this circumstance might exercise some—though probably a very slight—influence.

It is then only with reservation that any importance can be attributed to the circumstances mentioned in the previous pages as causes of the small number of children born in the marriages of deaf-mutes. It will be remembered that a third circumstance was mentioned as a possible cause—*viz.*, that for some reason or other the marriages in question had only lasted a short time when this investigation was undertaken. An examination as to this question shows that thirty-five of the one hundred marriages this investigation embraces—*i. e.*, *over one third of the marriages of deaf-mutes had lasted less than five years*. Table XV. shows then

TABLE XV.—NUMBER OF CHILDREN IN MARRIAGES OF DEAF-MUTES BY DURATION OF MARRIAGE.

DURATION OF MARRIAGE.	Both husband and wife deaf-mutes.		The husband only deaf-mute.		The wife only deaf-mute.		Total number of marriages.		Average number of children in each of these marriages.	Average number of children in ordinary marriages.
	Number of marriages.	Number of children.	Number of marriages.	Number of children.	Number of marriages.	Number of children.	Number of marriages.	Number of children.		
Under 5 years.....	17	11	15	15	3	5	35	31	0.88	1.18
5-9 years.....	8	21	11	28	4	10	23	59	2.57	2.63
10-14 years.....	4	4	8	33	3	12	15	49	3.27	3.64
15-24 years.....	1	—	6	22	2	1	9	23	3.55	4.46
25 years and over...	2	1	4	9	1	3	7	13	1.86	4.94
Duration not stated.	2	1	3	—	4	7	9	8	0.88	0.00
Total.....	34	38	47	107	17	38	98	183	1.88	3.07

that the small average number of children born in each marriage is principally due to the circumstance that the marriages which have lasted less than five years have produced such a small number of children, the average number of children in each of these only being 0.88, while the corresponding figure for the general population is, according to RUBIN and WESTERGAARD'S investigations¹—1.18. This result might, however, be easily explained by the fact that no less than 12 of these 35 marriages contracted by deaf-mutes had only lasted one year or less. Further, the table shows that the deaf-mutes' marriages, which had lasted 5-15 years, have been but slightly less fertile than those of the same duration amongst the general population, while the number of children born in those marriages contracted by deaf-mutes, which had lasted over 15 years, has been considerably less than that of marriages of the same duration amongst the general population. This latter result seems at the first glance to be difficult to explain. A closer examination

¹ *Loc. cit.*, p. 80.

shows, however, that the number of children born in these latter marriages is so much reduced because 5 of the 16 marriages this group embraces have been sterile, *i. e.*, 31 per cent., while RUBIN and WESTERGAARD found only 12 per cent. of general marriages of the same duration to be without any children. There is then every reason to presume that the result is produced by accidental causes connected with the smallness of the material, and as the wives in all these five sterile marriages were respectively 36, 38, 40, 41, and 51 years of age on entering into matrimony, there is sufficient reason to believe that the circumstance that all these marriages were sterile is principally owing to the fact that the wives were of advanced age at marriage.

According to what is stated in the foregoing, there is reason to conclude that *the small number of children born in the marriages contracted by deaf-mutes is, to some extent, owing to the fact that the average age at marriage of deaf-mutes and their husbands or wives, who were not deaf and dumb, is somewhat advanced, compared with that of the general population (applying especially to the deaf and dumb wives).* The principal cause must, however, be sought in the circumstance that comparatively many of the marriages contracted by deaf-mutes were of recent date at the time of the present investigation. This latter circumstance is undoubtedly owing to the increasing propensity amongst deaf-mutes nowadays to enter into matrimony. This is clearly shown by the fact that in 1850 there were only 32 married deaf-mutes in Denmark, corresponding to 737 deaf-mutes of both sexes and all ages,¹ while in 1886 there were at least 151 married deaf-mutes (see p. 408) corresponding to 1,255 deaf and dumb individuals. Table XVI. also shows that there were in 1886 comparatively many more recent and fewer marriages of older standing amongst the deaf and dumb population than amongst the population of Copenhagen, as stated by RUBIN and WESTERGAARD.²

¹ *Reports of the Statistical Bureau*, 1st collection, Copenhagen, 1852, p. 207.

² *Loc. cit.*, pp. 21 and 23.

TABLE XVI.—DEAF-MUTES' MARRIAGES ARRANGED ACCORDING TO DURATION AND COMPARED WITH THOSE OF THE POPULATION OF COPENHAGEN.

DURATION OF MARRIAGE.	Deaf-mutes.		Population of Copenhagen.
	Number of marriages.	Per cent.	Per cent.
Under 5 years.....	35	39.3	28.3
5-9 years.....	23	25.9	21.5
10-14 years.....	15	16.8	15.2
15-24 years.....	9	10.1	20.3
25 years and over.....	7	7.9	14.2
Total.....	89	100.0	100.0

Considering the smallness of the present material, and that there, as yet, exists no information from any other country, it is with great reservation that any statement can be made as to whether the circumstances mentioned in the previous pages explain sufficiently the small fertility of marriages of deaf-mutes stated to be present everywhere where this has been the subject of investigation, or as to whether there are other influential circumstances, and especially such as are more directly connected with the abnormality which deaf-mutes exhibit. Theoretical reasoning, based upon our present knowledge of the nature of deaf-mutism, does not seem to be in favor of the view that deaf-mutism being *in general* in itself a pathological condition which produces less generative faculty in the individuals concerned. On the other hand, it must be admitted that deaf-mutism *sometimes* appears as a congenital abnormality in families which exhibit signs of degeneration, and in such cases there might also appear sterility, or reduced generative faculty, in the individuals in question, which circumstance might be said to be due to causes in close connection with the deaf-mutism.

It remains to be mentioned that of the 183 children born in marriages contracted by deaf-mutes in Denmark, 89 were

males and 94 females. Of these 183 children, 41 were dead at the time of our investigation, 17 stillborn included, which shows a mortality rate of 22 per cent. RUBIN and WESTERGAARD found a rate of 30 per cent. in the marriages examined by them. On account of the smallness of the present material there is hardly any reason to consider the difference between these two rates as being of any importance.

It deserves notice that **not a single child born in the marriages of deaf-mutes was itself deaf and dumb**—a fact which does not stand in opposition to statements made by other investigators.

APPENDIX. SCHEDULES OF INFORMATION CONCERNING DEAF-MUTISM IN DENMARK.

FORM I.

REPORT FOR THE YEAR 18 FROM DIOCESE, OF A DEAF-MUTE,
WHO HAS NOT PREVIOUSLY BEEN REPORTED.

NOTICE 1.—Every child, who on account of congenital or acquired deafness or deficient hearing (whether it is perfectly dumb, or has any faculty of speech, or even perfect faculty of speech) *is not able to receive instruction in the same way as normal children*, is to be reported.

2. The deaf and dumb child must be reported as *soon as* the deafness or deficient hearing is evident.

3. It is to be observed that all deaf-mutes are reported, and that this is made known to all concerned by annual publications in schools, and from the pulpit, or by other means.

4. If in any parish there are no deaf and dumb individuals living, this is to be reported (on blank paper).

5. The questions 6—11 are to be answered as thoroughly as possible by the medical attendant of the family, or the medical practitioner living nearest. The form has to be sent back to the rector of the parish under the doctor's seal.

1. County, district, parish town?

2. Full name of the deaf-mute? Birth-place? Birth-day and -year?

3. The parents' names? Position? Circumstances? Age at the birth of the deaf-mute? Wedding day, and if either of them are dead. The day of death? Is there any consanguinity between the parents.¹

4. The brothers and sisters of the deaf-mute; their number (those dead included)? Sex? Age at time of the filling up of the form? What numerical place does the deaf-mute take amongst his brothers and sisters?

¹ It is of special interest to obtain information as to whether husband and wife are (were) uncle and niece, nephew and aunt, blood-related first or second cousins, and whether the consanguinity is (was) one-sided (existing only in the male or female line), or whether it is (was) double-sided (existing both in the male and female line).

5. Has the deaf-mute received instruction at home or at school, and with what result?

6. What is the mental state of the deaf-mute at the medical examination? What is the bodily state of the deaf-mute at the medical examination? Special information is required: as to (a) whether the deaf-mute is totally deaf, or only partially, and if the latter, in what degree, and (b), whether the deaf-mute has any faculty of speech, and if so, to what degree.

7. A. Is the deaf-mute supposed to be *deaf-born*? If so, information is wanted of what supports this view, especially: (a) If this view is supported by the medical examination of the deaf-mute (and if so in which way), and especially by the existence of congenital malformations of the hearing or other organs,—or by the doctor's knowledge of the state of the deaf-mute during the first period of his existence; and (b) if there has been anything during the pregnancy, or at the birth, which might be supposed to have caused the loss of hearing, and if so of what nature? B. Is the deaf-mute supposed to have become *deaf after birth*? If so, information is wanted as to: (a) At what age the abnormality was first discovered; (b) what at that time supported the conjecture of its existence; (c) whether its appearance can be connected with a special cause, such as scarlet fever, measles, diphtheria, typhoid (enteric) fever, mumps; or other acute diseases; or to meningitis, or other diseases of the brain, or to traumatic lesions, *etc.*; or to a primary ear-disease; or to any constitutional disease, such as rickets, scrofula, hereditary syphilis, *etc.*; (d) whether this cause is known or supposed to have produced a diseased condition (and if so which) in the ear itself, or whether it is supposed to have influenced the central nervous system.

8. The parents of the deaf-mute? Are (were) any of these deaf and dumb, deaf, or suffering from ear-disease, and if so from which kind?

9. The brothers and sisters of the deaf-mute: Are (were) any of these deaf and dumb, deaf, or suffering from ear-disease, and if so from which kind, and what numerical place has he (she, or they) amongst the brothers and sisters?

10. The relations in older generations of the deaf-mute's family: Are (were) any of these deaf and dumb, deaf, or suffering from ear-disease, and if so from which kind?

11. (a) Has there been amongst the brothers and sisters, or the parents, or the relations in the older generations of the deaf-mute's family any one suffering from other abnormalities such as: Lunacy; idiocy, or noticeably deficient development of the mental power; convulsions; epilepsy; palsies (paraplegia, hemiplegia, circumscribed palsies); hysteria; stuttering and stammering; eye-diseases, especially deficiency of vision, nocturnal blindness (retinitis pigmentosa, hemeralopia); or other nervous diseases? (b) Has either of the parents of the deaf-mute been intemperate, and if so has it influenced him (her) mentally or physically, and how?

Questions 1 to 5.

Questions 6 to 11.

Date..... Date.....

Signature of Clergyman Signature of Medical Man.....

FORM II.

REPORT FOR THE YEAR 18 FROM DIOCESE, OF A DEAF-MUTE,
WHO HAS BEEN PREVIOUSLY REPORTED.

1. County, district, parish town ?
2. Full name ? Age ? Birth-place ?
3. What are the deaf-mute's *principal means of communication* : Oral speech, writing, dactylology, or gesture-language ?
4. Is the deaf-mute instructed at home (if so by whom), or in one of the existing institutions for deaf-mutes, and if so in which ? When did the deaf-mute leave the institute ? Is the deaf-mute confirmed ?
5. What is the deaf-mute's trade ? Can he (she) support himself (herself), or does he (she) receive public support ?
6. Is the deaf-mute married ? If so, when ? Is the deaf-mute a widower (widow), and if so since when ?
8. The name, birth-day, birth-year, and birth-place of the wife (husband) of the deaf-mute ?
8. The children born in the marriage (those dead included) : Number ? Sex ? Name, birth-day, birth-year (eventually death-year) ? Birth-place ?
9. Are (were) any of the *brothers and sisters* of the deaf-mute, deaf and dumb, deaf, or suffering from ear-disease, and if so from which kind ?
10. Is (was) *the wife (husband)* of the deaf-mute or any of his (her) relations deaf and dumb, deaf, or suffering from ear-disease, and if so from which kind ?
11. Are (were) any of *the children* of the deaf-mute deaf and dumb, deaf, or suffering from ear-disease, and if so from which kind ?
12. To be noted here when the deaf-mute dies or leaves the parish.

Date.....

Signature of Clergyman.....

CONTRIBUTION TO THE SURGICAL TREATMENT OF EAR DISEASES.

By Dr. E. SCHMIEGELOW, of COPENHAGEN.

(Abstract of a communication to the Medical Society of Copenhagen.)

Translated by ALEXANDER DUANE, M.D., New York.

THE author of this communication touched upon only one group of the suppurative affections of the middle ear, namely, those accompanied by defects in the membrana flaccida, or upper portion of the tympanic membrane. He called attention to the peculiar relations existing in the uppermost division of the tympanic cavity, or *attic* as it has been called, a chamber which surrounds the head of the malleus and the incus, and which is thus divided into an inner and an outer portion, the latter lying to the outside of the malleus and incus and between them and the outer wall of the attic. This wall is formed by a bony plate which is part of the roof of the external auditory canal. The outer portion of the attic is bounded below by Shrapnell's membrane, and consists in part of a system of small, communicating cavities due to the presence of inter-anastomosing processes thrown out by the mucous membrane and extending from the wall of the attic to the mucous lining of the head of the malleus. A collection of pus in this outer division of the attic must necessarily perforate Shrapnell's membrane, and it happens quite often that cases are met with of suppuration of the middle ear, which are confined to the uppermost portion of the tympanum without affecting any other part of the tympanic cavity.

Acute cases in which there are collections of pus in the middle ear that discharge through Shrapnell's membrane are very rare. Out of 384 cases of acute suppuration of the middle ear Schmiegelow has seen only six (or scarcely 1.6 per cent.) in which the perforation was situated in Shrapnell's membrane. If these cases are neglected, stagnation of the secretion is very apt to occur and thus there is produced the chronic form which leads to destruction of the bones of the ear by caries, to perforation of the tegmen tympani, and to consecutive endocranial complications.

Treatment therefore must aim at preventing this retention and furnishing the most favorable conditions for drainage. This is best accomplished by making sufficiently large incisions in the lower part of the drum-head, through which the pus can make its escape more readily than would be the case if the attempt was made to force it through the aperture which is situated in Shrapnell's membrane and hence lies high up. In addition the perforation in Shrapnell's membrane, if very small, should be enlarged.

Chronic suppuration of the middle ear associated with perforation of Shrapnell's membrane is met with much more frequently than the acute form. In 924 cases of chronic suppuration of the middle ear, Schmiegelow found perforation of Shrapnell's membrane 54 times, that is in 5.8 per cent. Perforation of the uppermost portion of the drum-membrane is often overlooked, particularly in the large public clinics. Among 654 patients treated in dispensaries such perforations were observed only 17 times (= 2.6 per cent.), while in 275 cases of chronic suppuration of the middle ear treated in private practice they were observed 37 times (= 13.5 per cent.); and this latter figure Schmiegelow regards as more correctly expressing their frequency.

Cases of chronic suppuration of the middle ear having their seat in the uppermost portions of the tympanic cavity are extremely slow and pursue a very insidious course without causing any marked symptoms, until all of a sudden violent, acute, endocranial or universal (pyæmic) complications set in. They are often associated with the formation of cholesteatomata which cause the destruction of the surrounding bony parts including both the ossicles and the walls of the attic.

The treatment must be very energetic. Ordinary antiseptic injections through the auditory canal are of no service whatever, since the perforations are small and situated high up, and the secretion is more or less cheesy. A better effect is secured by injections through the Eustachian tube, but in three fourths of the cases such injections are inapplicable because in this affection the uppermost part of the drum-cavity is ordinarily separated completely from its lower portion by pathological adhesions. *Injections through the perforation with the aid of Schwartze's or Hartmann's tympanic cannulæ may be employed in conjunction with the enlargement of the perforation by the galvano-cautery and with the application of caustics melted upon the points of slender sounds.*

With this more conservative treatment the result in Schmiegelow's fifty-four cases was as follows: In twelve cases the result was unknown, sixteen were cured, eleven were improved, and fifteen gave a negative result.

In twenty cases it was necessary to perform excision of the tympanic membrane and of the ossicles, particularly the malleus and incus.

In fourteen cases extensive caries was found in the malleus, in two cases this bone was perfectly healthy, in two cases precise data were not forthcoming, and once nothing but the handle of the malleus was removed.

The incus was carious in all cases (three times in conjunction with the malleus and once alone) in which it was removed.

In nine cases there was a cure, in eight improvement, in two cases the operation had no effect upon the local condition, and in one case the result was unknown, as the patient stopped coming shortly after the performance of the operation. As regards the function, the hearing was more or less improved in ten cases, and in six remained as it was before the operation. In three cases a slight diminution in the hearing was made out to exist.

Schmiegelow, after having discussed at length the way in which excision of the malleus and incus together with the drum-membrane is to be performed, remarked that although we are able by means of this operation to cure many such

cases of suppuration of the middle ear, or at least are able to produce a favorable effect upon the course of the disease, there are cases in which the suppuration is not improved by operative interference. The cause of this was that, besides the inflammatory condition of the ossicles, there was present either a carious affection of the walls of the attic or a carious process with the formation of cholesteatomata in the antrum and mastoid cells. In the latter event a good result could be secured by making a supplementary operation and chiseling into the mastoid antrum. In four out of the twenty cases Schmiegelow was for this reason obliged to chisel into the mastoid antrum after having removed the ossicles.

To operate for carious affections of the walls of the attic we may, as proposed by Wolf and Kiister, chisel into the antrum and at the same time remove the posterior wall of the auditory canal in its entire length. By so doing we gain room so as to be able to work to better advantage with the sharp spoon in the deeper parts.

It is still better to operate in the way proposed by Stacke. He detaches the external ear and the periosteum as well, by a curved incision running behind and above the ear, thus exposing the external aperture of the bony meatus, divides the periosteal lining of the bony meatus as close to the drum-membrane as possible, and then draws the cutaneous canal out from the osseous meatus. He next removes the malleus and drum-membrane and chisels away the deepest portion of the roof of the auditory canal, by which means the outer wall of the attic is removed. The incus is now taken away, the diseased areas in the attic are treated with the sharp spoon, and, after everything unhealthy has been removed, the cutaneous canal is put back in place and the cutaneous wound is entirely closed by sutures. Schmiegelow has performed the operation eight times, but did not care to go fully into the details, as too short a time had elapsed since their performance for him to have any confirmed views as to the ultimate result. Lastly Schmiegelow, to show the peculiar anatomical conditions in the attic, gave a demonstration with the microscope of a set of consecutive microscopic sections.

ON THE PATHOGENESIS OF TRANSUDATION INTO THE MIDDLE EAR IN CASES OF STOPPAGE OF THE TUBE.

BY Dr. ARNO SCHEIBE, MUNICH.

Translated by Dr. WARD A. HOLDEN.

SO long ago as 1889 I examined serum from the middle ear in cases of stoppage of the tube, and in none of the four cases were micro-organisms found.¹ A year later Kanthack² examined seven such cases in Hartmann's clinic, from all of which he cultivated cocci, and from six, bacilli also. As Moos³ has recently expressed the opinion that microbes are present in the disease, I have again studied a number of these cases.

The condition resulting from simple closure of the tube is readily differentiated from the inflammatory affections of the tympanic cavity.

The membrana tympani shows the characteristic signs of retraction which Bezold⁴ describes as follows: "The long process of the malleus appears more oblique and foreshortened, and the lower half of the membrana tympani is relatively larger than usual. The short process of the malleus, pushed somewhat downward, is prominent, and Shrapnell's membrane about it is retracted and may exhibit various folds, one of which, quite pathognomonic, extends in most cases from the short process downward and backward, and in some

¹ These ARCHIVES, vol. XIX., p. 163.

² *Ibid.*, XIX., p. 25.

³ *Deutsche med. Wochenschr.*, 1891, No. 11.

⁴ *Berliner klin. Wochenschr.*, 1883, No. 36.

cases is so marked that it may conceal the manubrium of the malleus. The thin membrana tympani lies like a wet cloth on the structures of the tympanum. For this reason the short process often projects like a pyramid, and the line of the handle of the malleus appears as a broad white band, because the membrana tympani lies not only on its outer margin, but also on its posterior surface. Even deeper-lying structures may be seen through the membrana tympani in consequence of its retraction; thus we frequently see the lower end of the long process of the incus, and the tendon of the stapedius muscle running perpendicularly to it, as a white triangle near the superior posterior margin. The color also is usually altered, and is darker, partly as a result of the retraction, partly due to the optical effect of the hyperaemia ex vacuo, which is caused by the rarefaction of the air, and shows through the *Mt.*"

The most important information, however, is furnished by the changes in the reflexes. "The normal triangular reflex may become longer and narrower, may disappear entirely, or may be displaced from the umbo toward the periphery and assume a more circular or irregular form, and often an increased lustre (concavity reflex). Besides this we may have, between the latter and the periphery, the linear reflexes which Politzer has described. A number of other reflexes characteristic of retraction are frequently found in the neighborhood of the short process. Above the short process, in Shrapnell's membrane, one or more concavity reflexes may be seen. The punctate reflex of the short process becomes lengthened into a line which extends along the margin of the posterior fold, or the entire posterior superior triangular portion above the posterior fold furnishes a reflex, as it forms a surface perpendicular to the visual line of the observer. A series of reflexes may appear at any point where there is a local retraction of a particular portion of the membrana tympani, and also in atrophy of the entire membrane (collapse)." In complete atrophy we often find a semicircle of reflexes resembling a rosary near the periphery below.

If the air douche be employed in these cases, the membrane

is pushed outward and the hearing at once becomes normal or nearly so.

In many cases we find, besides what has been mentioned, a reddish-yellow or bottle-green color, sharply marked above, differing from the yellow color seen in purulent cases, and the patient has perhaps a feeling as of water in the ear.

In these cases the air douche improves the hearing, but a single employment of it never has so marked an effect as in simple closure of the tube. If paracentesis be done the reddish-yellow color changes at once as a result of the admission of air. No fluid escapes at first. If the air douche be now used, a quantity of amber-yellow, partly serous, partly viscid, transparent fluid escapes. When the paracentesis wound is healed, which may be a day or two after, the symptoms of simple stoppage of the tube may remain, or the hearing and the membrane may be normal.

Probably in every case of stoppage of the tube there is at least a small quantity of this fluid present.

When the fluid is removed for examination, some fresh blood from the paracentesis is mixed with it, but besides this the only solid elements in the fluid are red and white blood corpuscles, regularly distributed, and epithelium from the mucous membrane, the latter cells few and isolated. Old cases show fewer cells than fresh ones. The white corpuscles are often present in greater number than red ones. The red are not arranged in rolls and are paler than normal. The white corpuscles are often irregular in outline and contain fat granules. Fibrin is also found.

In these last bacteriological examinations I have changed the method.

No plate cultures were made, but with a large platinum loop full of the fluid linear inoculations were made in agar tubes, which were kept in an incubator at 35° C.

Before the paracentesis the external canal was syringed several times with 4 per cent. carbolic solution, and this was allowed to remain five minutes in the canal. The canal was then thoroughly dried through a sterilized speculum with sterilized cotton. Speculum and needle were cleaned in 5

per cent. carbolic solution and dried with sterilized cotton or over a flame.

In this manner seven cases of accumulation of serum in the middle ear with stoppage of the tube were examined. In no case did a single colony develop in the tubes. For the purpose of control, other microbes were inoculated into the same tubes later and all developed colonies.

In making preparations of large quantities of serum according to Gram's method, cocci could be discovered only in those cases in which the fluid also contained pavement epithelium from the canal. The number of cases, however, in which the serum was not contaminated with cells from the canal, and in which cocci were wanting, is too small to justify the assertion that there are not possibly some few cocci in the middle ear. Nevertheless the number of these cocci must be so small that they cannot be considered the cause of an inflammatory secretion, and therefore the designations "acute catarrh of the tympanic cavity" (Schwartz, Gruber, Urbantschitsch), "otitis media serosa" (Zaufal), and "secretory form of middle-ear catarrh" (Moos, Politzer), may cause confusion.

Bezold explains the process as follows: "As in all vascular pneumatic cavities, whose communication with the outside air is cut off, we soon find in the middle ear a diminution in the volume of air. Since the oxygen is taken up by the circulating blood, and carbonic acid is not given off in equal volume, the pressure of the air is diminished in the closed cavities, and this first makes its influence felt in the yielding walls of the tympanic cavity, the tympanic membrane, on the one side, and the membranes of the fenestræ in the labyrinth wall on the other." The vessels of the mucosa dilate in consequence of the diminished pressure, and the outer air forces the membrana tympani and the chain of ossicles inward. We get in this way the picture of the simple stoppage of the tube.

If now this stoppage continues for a time the result of the hyperæmia ex vacuo is the transudation of the serum and a small number of the corpuscles of the blood from the vessels in the cavities of the middle ear. The red and white

corpuscles then undergo the changes that were described above. The viscid, stringy condition of the serum is due, according to Kessel,¹ to the disintegration of the white corpuscles.

A case that I have described,² with cicatricial obliteration of the pharyngeal mouth of each tube, showed that with continued stoppage of the tube the evacuation of the serum is followed by its re-accumulation.

Bezold, in his statistical report, has called the disease in question "closure of the tube with serum (in the middle ear)," and given it a separate heading. This designation is long and might be replaced by "transudation into the middle ear." In this category are then included also those cases in which from any cause whatever there is a stoppage of the aditus ad antrum or the passage to one of the peripheral pneumatic cells, and in which the pneumatic cavities farther back become filled with serum, as is often found at autopsies. The cause, for example, catarrh of the tube, and the position of the closure, for example, cicatrices at the tympanic mouth of the tube, or closure of the passage to a cell from whatever cause, might then make up the subdivisions.

Besides these cases of transudation into the middle ear, I have also examined a number of those cases of fresh *inflammatory* affection of the middle ear which have no tendency to perforate, and in which the paracentesis wound heals readily (otitis cat. acuta and subacuta.)

In otitis media cat. acuta, which is readily distinguished from transudation into the middle ear by its inflammatory symptoms, Weichselbaum, Netter, and Gradenigo have found microbes. I found the streptococcus pyogenes in one patient, and the diplococcus pneum. once in a dead subject.

Subacute catarrh of the middle ear must be differentiated from the acute form on clinical grounds, since the subjective inflammatory signs are so often wanting, and the objective signs of inflammation in the middle ear are always present, but less marked or not noticeable, in the membrana tympani.

¹ *Deutsche med. Wochenschr.*, 1891, No. 48.

² *Ibid.*, vol. xix., Case 14.

When subacute catarrh is complicated with stoppage of the tube, it may greatly resemble simple stoppage of the tube. Yet there are marked differences in the course of the disease and the nature of the secretion. In the latter, according to my observation, the pale red blood corpuscles are always wanting but there are numerous epithelial cells, pus cells, and microbes in great number.

A STUDY OF SOME TOPOGRAPHICAL RELATIONS
OF THE TEMPORAL BONE.

(*Third Series.*¹)

BY DR. OTTO KÖRNER, FRANKFORT—O.M.

Translated by DR. WARD A. HOLDEN.

THE following investigations were undertaken principally for the purpose of verifying previous results by using a perfectly reliable method.

My material consisted of 54 horizontally-cut temporal bones from 27 skulls of various races, these skulls being included in the 87 on which I made my first report.

As before, I call skulls with an index greater than 1.3 dolichocephalic, those with an index below 1.3 brachycephalic.

The temporal bones were sawn out of the skulls which had been divided in a sagittal median plane, and were then divided by a horizontal section in the axis of the external canal. All measurements were made on the upper and lower portions so obtained.

For the measurements I used especially constructed steel compasses. The registering branches were straight and long enough to permit the reading of tenths of a millimetre on the scale at the end. The measuring branches terminated in a sharp point. All measurements were recorded in millimetres.

I.—The differences in breadth and depth in the two transverse sulci, and the variations in the two jugular fossæ.

¹ These ARCHIVES, vol. xvi., p. 281 ; vol. xviii., p. 210.

It has long been known that the right transverse sinus is mostly larger than the left, and that in consequence the sigmoid fossa of the right transverse sulcus mostly extends deeper anteriorly and farther outward in the base of the petrous portion of the temporal bone than the left (Bezold, Rüdinger, Hartmann, Heim, V. Meyer, Körner, and others).

Accurate measurements of these variations have hitherto been wanting.

I found the average thickness of the outer wall of the transverse sulcus at its thinnest point in the mastoid region, right, 6.00, left, 8.55 *mm*—the average difference between the two being 2.55. The greatest difference in a single skull was 6.6.

The shortest distance from the transverse sulcus to the external canal: average, right, 11.86; left, 12.91, difference 1.05. The greatest difference in a single skull, 7.2.

Theile, Rüdinger, and I have shown that the jugular fossa corresponding with the greater size of the right transverse sinus is much larger and deeper on the right side than on the left. I have shown further that in consequence of this relation defects in the floor of the tympanic cavity are more frequently found on the right side than on the left.¹

Accurate measurements of the depth and width of the jugular fossa are not possible on account of its varying form. It is also impossible in all cases to measure the thickness of the bony wall between the tympanic cavity and the jugular fossa, since frequently irregularities in the floor of the cavity interfere.

In order to obtain sure and comparable measurements I took the shortest distance between the jugular fossa and the tympanic sulcus. This distance varies between 0.5 and 8 *mm*, and was, on the average, right, 3.51; left, 3.67. The greatest difference between the two sides in the same skull was 5.3.

II.—Influence of the form of the skull upon the position of the transverse sulcus.

Bezold was the first to notice that the deep extension of the sigmoid fossa of the transverse sulcus into the base of

¹ *Arch. f. Ohrenh.*, vol. xxx., p. 230.

the petrous portion of the temporal bone, as well as the deeper situation of the middle fossa of the skull, are found for the most part in brachycephalic skulls. I have repeatedly been able to confirm this statement, but have maintained, contrary to Schülzke,¹ that exact measurements can be got only on divided temporal bones.

Such measurements I now give.

AVERAGE DIMENSION IN	INDEX OVER 1.30	INDEX UNDER 1.30	TEMPORAL BONES
	32	22	
Thickness of outer wall of transverse sulcus at its thinnest point in the mastoid region.	8.54	6.53	Average difference between dolichocephalic and brachycephalic skulls. 2.01
Shortest distance between external canal and sigmoid fossa.	12.50	12.21	0.29

The difference in the various skulls is not sufficiently shown by these figures, since but few of the bones measured were from extreme forms of skulls, there being no brachycephalic skull over 1.16 index; among them, however, the average difference found here between brachycephalic and dolichocephalic skulls approximates the marked difference in depth between the right and left sulci.

III.—Influence of the form of the skull on the situation of the floor of the middle cerebral fossa.

I have previously shown that the floor of the middle fossa in dolichocephalic skulls lies higher above the external canal and the spina supra meatum than in brachycephalic skulls.

In order to obtain the differences in height between points outside and inside the skull, the fixed points must be projected in a plane.

¹ *Z. c.*, vol. XXX., p. 134.

To get the simple direct measurements I have given up the designations inner and outer starting-points, and instead of these as a measure of the distance from the floor of the middle cerebral fossa to the external canal, I have taken the thickness of the upper wall of the canal at two different points.

I.—Measurements in the middle of the upper wall of the External Canal.

	INDEX ABOVE 1.30		INDEX BELOW 1.30	
	Right	Left	Right	Left
Average	6.76	7.19	5.01	5.63
Maximum.....	11.0	12.0	8.0	8.6
Minimum.....	4.3	4.3	2.4	2.6

II.—Measurements at the inner ends of the External Canal (at the margin of the Incisura Rivini).

	INDEX ABOVE 1.30		INDEX BELOW 1.30	
	Right	Left	Right	Left
Average	6.47	6.95	5.41	5.68
Maximum.....	10.3	11.0	8.5	8.0
Minimum	4.6	4.8	4.3	3.2

As in all my earlier measurements, the dolichocephalic skull gave not only higher average figures, but in the measurements at both places, without exception, higher maxima and minima than the brachycephalic. That is the best proof of the constancy of the relation found.

The thickness of the upper wall of the canal varied between 2.4 (brachycephalic) and 12.0 (dolichocephalic).

A new fact was found, viz., that here also there is a marked difference between the right and the left side. The bony roof of the canal was *thicker on the left side* in nineteen cases, thicker on the right side in six, and equally thick on each side in two.

IV.—The tegmen tympani and its defects.

I have previously spoken of the frequency with which spontaneous defects are found in the tegmen in brachycephalic skulls, and the rarity in dolichocephalic, and have

called attention to this fact in connection with the apparent difference in the thickness of the roof of the tympanic cavity in the two forms of skull.

Accurate measurements of the thickness of the tegmen, however, cannot be made. The under surface of the tegmen is often, like the floor of the tympanic cavity, rough and uneven, and at times shows openings into the epitympanic cells, so that I could not be sure where the point of the compasses should be placed. And as the bony plate to be measured is often only a fraction of a millimetre thick, the slightest error makes the measurement worthless.

It is, however, important to recognize the frequency of defects with a particular type of skull, and therefore I have continued my studies on a further series of skulls. I used first the collection of the Anatomical Institute and that of the Imperial Museum in Vienna, and later the Billharz collection of negro skulls in Freiburg.

The results were as follows :

	INDEX OVER 1.30		INDEX UNDER 1.30	
	without defects	with defects	without defects	with defects
Skulls from the collections in :				
Frankfort and Marburg (earlier studies)	39	0	83	9
Vienna and Freiburg.....	32	1	37	8
Total.....	71	1	120	17
	72		137	
Number of skulls.....	209			

Thus defects were found in the tegmen tympani in 1 of 82 dolichocephalic skulls, or in 1.4 per cent.; and in 17 of 137 brachycephalic skulls, or in 14.16 per cent., ten times as frequently in the latter as in the former.

V.—The position of the carotid canal relative to the tympanic cavity.

To get the distance of the carotid from the tympanic cavity, I measured the least distance between the tympanic sulcus and the carotid canal and found it to vary from 1.0 to 7.8, on an average 3.23. A difference in different types of skull was not found, but there was a slight difference between the two sides. The left carotid lay nearer the tympanic sulcus

than the right in 16 cases, the contrary was true in 10 cases, and in one case there was no difference between the two sides. The average distance was, left, 3.08; right, 3.14. The greatest difference in a single skull was 2.8.

In the negro skulls I found conditions which might easily permit the wounding of the carotid from the external canal. In one there was a defect and in the other an extremely thin wall between tympanic cavity and carotid canal opposite the external canal.

VI.—The position of the facial canal and the external semicircular canal relative to the tympanic sulcus.

In chiselling through the superior and posterior wall of the external canal into the attic of the tympanum and the aditus ad antrum, we run the risk of wounding the facial canal and the outer semicircular canal. In order to avoid this, Hartmann made measurements which showed how far the dangerous points are from the spina supra meatum and from a point 1 *cm* behind it.

As it may at times be necessary to remove the spine with the superior posterior wall in making a large opening into the tympanic cavity, we lose the guiding point.

I believe that in the posterior margin of the tympanic sulcus I have found a valuable landmark which may be used in such operations.

On the cut surface in my preparations the facial canal is distant from the posterior margin of the tympanic sulcus from 1.5 to 4.3 *mm*, 3.08 on the average, and mostly lies somewhat farther outward than the sulcus (usually 1.0–2.0, at the most 3.7). These figures apply only for the middle of the posterior margin of the sulcus. Exactly above this point the canal bends so that one can chisel into the aditus ad antrum above the height of the middle of the external canal, without reaching the nerve. It may also be mentioned that the canal at the height of the cut surface is in most cases separated from the mastoid cells by a 1–3 *mm* thick, dense bony sheath, a continuation of the labyrinth capsule.

The most external semicircular canal which was not reached by the section in many of my preparations, but lay above it, was on the average 6.13 *mm* distant from the tympanic sulcus, and somewhat lower.

VII.—The structure of the mastoid process in the various types of skull.

So far as could be made out from bones sawn through once, the condition of the mastoid process was as follows:

			INDEX ABOVE 1.30	INDEX UNDER 1.30	TOTAL
Condition of Mastoid	Uniform	Pneumatic.....	24	11	35
		Compact.....	0	6	6
		Diploic.....	0	2	2
	Mixed	Pneumatic—Compact..	2	1	3
		Pneumatic—Diploic...	6	2	8
Number of bones.....			32	22	54

In the 54 specimens, 35, or 64.8 per cent., were pneumatic, a high figure compared with Zuckerkandl's statement, according to which only 36.8 per cent. of mastoids are pneumatic. His statement was made after the examination of Middle-European skulls, mostly brachy- and meso-cephalic. My examinations show that pneumatic mastoids occur chiefly in dolichocephalic skulls. The skulls with an index over 1.30 had purely pneumatic mastoids in 75 per cent., and principally pneumatic mastoids in 25 per cent., no single skulls being purely of diploic or compact structure.

The predominance of the pneumatic structure in dolichocephalic skulls is probably due to the greater distance of the middle and posterior fossæ from the external canal and tympanic cavity, since pneumatic cavities in other places are found more in well developed bone than in that less developed. Comparative anatomy also confirms this rule, as, for example, in the frontal bone of the elephant. Politzer's statement, that the distance from the transverse sulcus to the external canal with a pneumatic mastoid is mostly great, and with a diploic or compact mastoid small, agrees with what I found, as I discovered that an extension forward of the transverse sulcus and a compact or diploic structure of the mastoid is mostly in brachycephalic skulls, and pneumatic structure and a great distance between the transverse sulcus and the external canal chiefly in dolichocephalic skulls.

A MARKED CASE OF RUDIMENTARY AND
DISPLACED AURICLE, WITH DEFECTIVE
DEVELOPMENT OF THE SIDE OF THE FACE.

By H. KNAPP.

(*With three figures.*)

ORDINARY cases of malformation of the ear, either by excessive or defective development or displacement, are not infrequent; also their combination with slight or moderate degrees of defective development of the face is not rare, but the higher degrees of this combination are, if I may rely on my own experience, seldom met with. A conspicuous example of this kind which came under my care last year, and of which I made careful notes and measurements, may therefore find a passing notice in these ARCHIVES.

July 28, 1891, Theod. Young, of New York, brought his two-week-old son to my consultation room. Both father and mother were healthy, the father thirty, the mother twenty-seven years of age. The little patient was their fourth child, and the only one that had any deformity. The left ear and the whole left side of the face were well developed (Fig. 1). The right side of the face, however, (see Fig. 3) was sunken and smaller in all its dimensions.

Both sides of the head proper were well developed and fairly symmetrical.

The right auricle was shrunken and misshapen. The upper cartilaginous part was a hard, bent ridge; the lower, soft, fibrous part (the lobule) was directed backward, almost at a right angle with the other. The whole deformed rudiment of the ear was much nearer to the bridge of the nose than the ear on the left side, the relative distances being 35 mm on the right side (Fig. 2)

and 49 *mm* on the left (Fig. 1). Behind the rudimentary right auricle, at the place where the auricle ought to have been, there was a shallow depression, indicating the orifice of the closed ear canal. Seen from in front (Fig. 3), the asymmetry of the face was very conspicuous, the distance from the nose to the ears measuring 37 *mm* on the right side and 45 *mm* on the left. The

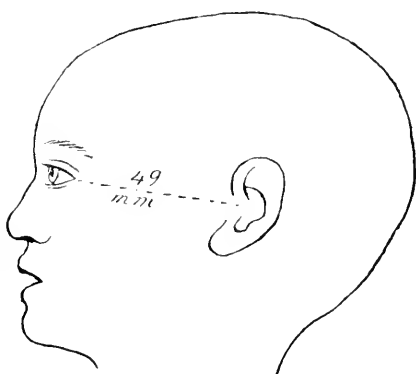


FIG. 1.



FIG. 2.

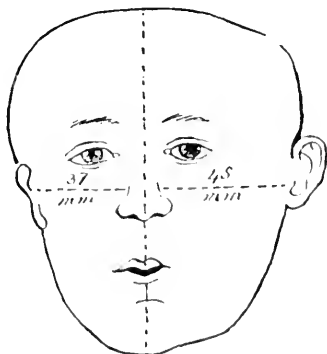


FIG. 3.

depression in the face indicated that, besides the temporal bone, the malar, palatal, and superior maxillary bones and the right half of the inferior maxillary must have been atrophic. Examinations of the buccal cavity and its contents were omitted. The child seemed to be healthy. I saw it no more, and when six months later I enquired after it, the father wrote me that the child had died at the age of two months and nineteen days.

The literature on malformations of the ear is quite extensive, and the cases in which the malformations were complicated with defective development of other parts of the head seem to have particularly awakened the attention of authors. By a number of post-mortem examinations (Michael Jäger,¹ Allen Thomson,² Wilde,³ Toynbee,⁴ Lucae,⁵ Moos and Steinbrügge,⁶ Jos. Gruber⁷ and others) it is demonstrated that ordinarily with the rudimentary auricle bony closure of the ear canal and defective development of the middle ear are connected, whereas the inner ear is mostly but little or not at all changed. In a certain number of the cases the temporal, malar, palatal, and both maxillary bones have been found defective. Gruber (*l. c.*) and Schwartze⁸ give drawings, in which the asymmetry of the face is, however, not very conspicuous. Virchow⁹ publishes the autopsy of several cases, and concurs in the opinion of Heusinger,¹⁰ who considers the malformations of the auricle due to irregular closure of the aural branchial cleft. Virchow elaborates this theory, believing that malformations of the ear and the adjacent parts of the skull originate in early disturbances in the closure of the first cervical branchial cleft. He thinks that these changes are not simply defects, but the result of irritative processes, causing indurations, adhesions, scar-like retractions, synostoses, hyperostoses, and other kinds of hypergenesis. "We have here, as in so many other monsters, to deal with very early multiple irritations or inflammations; if you like, a phlogistic diathesis." The writer was not aware that the theory of the phlogistic origin of congenital defects had in its support so high an authority as Virchow.

¹ Von Ammon's *Zeitschr. f. Ophthal.*, Bd. v., 1837, p. 4.

² *Edinburgh Monthly Jour. Med. Science*, April, 1847.

³ *Diseases of the Ear*, Phila. ed., 1853, p. 160.

⁴ *Diseases of the Ear*, 1858, p. 15.

⁵ *Virchow's Archiv.*, Bd. xxix., 1864, p. 62.

⁶ *ARCHIV. OF OTOL.*, x., p. 54, 1881.

⁷ *Diseases of the Ear*. Translat. of 2d ed. into English, 1891, p. 211.

⁸ *Lehrbuch d. chir. Krankh. des Ohres*, 1885, p. 67.

⁹ *His Archiv.*, vols. xxx. and xxxii.

¹⁰ *Virchow's Archiv.*, xxix., p. 361, Plate xii., Figs. 2 and 3.

A STRIKING CASE OF SIMULATED DEAFNESS.

BY DR. THOMAS BARR, GLASGOW.

THIS was the case of a girl, a domestic servant, sixteen years of age, who was admitted to the Glasgow Ear Hospital on March 15, 1892, apparently absolutely deaf.

History before Admission : She reported that on a Sunday morning, four weeks before admission, as she was recovering from a severe cold in the chest and head, attended by loss of voice, she did not hear the sermon in church so well as usual. At the evening service she experienced still greater difficulty; on Monday and Tuesday she became worse and worse, until on Wednesday morning she found herself totally deaf on both sides.

In a letter received by me from a friend it was stated that she could not hear the report of a pistol fired close to her ear. Her doctor wrote in the following terms: "I saw her a fortnight ago for the first time and found her hearing quite gone, not even hearing the tuning-fork. I tried blistering over the mastoids, and potass. iodid. internally, but with no benefit. She has also been having strychnine internally and pilocarpin hypodermically, but with negative results." For a few days at first there were bells ringing in her ears, but these sounds passed off. She experienced no giddiness. Before this she had occasionally been temporarily dull from cold.

For a week her mistress had to communicate with her entirely by writing. After a time, however, she professed great proficiency in lip-reading, which had been acquired in a very sudden way. On Sunday morning, three weeks after

the beginning of the deafness, when her mother asked: "What are you going to have for breakfast?" she discovered that she could make out by looking at the face and lips what her mother said.

Condition on Admission: Loud shouting close to either ear or through a conversation tube produced no response. She disclaimed the power of hearing not merely articulate speech, but of hearing *any sound whatever*. When a large tuning-fork vibrating strongly was applied over the mastoid, near the orifice of the ear, or to the teeth, she shook her head and professed to perceive nothing. The objective examination of the ears furnished no information; the external and middle ears presented no signs of disease. The tonsils were, however, much enlarged. She claimed to have acquired the power of lip-reading, and gave no heed to any question or remark made to her unless she were looking intently at the speaker's face. On testing her carefully in regard to this professed power of lip-reading, she was found to understand wonderfully well when the conversation was audible, but when tested in such a way that the speaker did not emit a sound, while producing the facial, labial, and other movements associated with speech, she understood only in an extremely limited way. This peculiarity in lip-reading and her protestations of total deafness to all sound, aroused suspicion in my mind as to the reality of the deafness, and, partly to secure close observation, she was admitted to the Glasgow Ear Hospital.

Course after Admission to Hospital: The curator and matron co-operated in observing her closely. She continued to profess absolute deafness to all sound whatever; she ignored every question or remark unless her attention were first secured by touch or sign, when she looked intently into the speaker's face. If the matron questioned her in the dark or when alongside of her, she insisted upon first having the matron's face in the light and gazing upon it. She pretended to have greater difficulty with men who had moustache or beard. Various plans were tried to take her off her guard, such as asking her to go after examining her, and shouting to her when asleep, but with no success: she

always maintained the rôle of total deafness. Some of the servants in the hospital, who knew nothing of our suspicions, remarked that the patient sometimes seemed to get her hearing back for a moment and then it passed away again entirely. They had observed that she appeared at times to know what they said in circumstances which precluded the possibility of lip-reading. On two occasions when persons shouted very loudly into the ear she was observed to wink, although she refused to admit hearing anything. Notwithstanding our suspicions, it was resolved to treat her on the assumption of the reality of the deafness. The enlarged tonsils were at first excised, then pilocarpin, by subcutaneous injection, was administered twenty times at intervals of one and two days. On the first two occasions she received one eighth of a grain, afterwards a quarter of a grain. She remained in bed two hours after each injection, and salivated and perspired very freely. It appeared that when treated at home with hypodermic injections of pilocarpin, she sat on a chair at the fireside after each injection and neither perspired nor salivated.

Entire Recovery of Hearing : After having been in the hospital for five weeks we received demonstration that *she really heard*. A servant in the hospital had musical proclivities, and frequently sang to the indoor patients. One afternoon our patient was heard to sing the identical songs which had been sung by the servant in the forenoon of the same day. In the case of one of these songs at least, she admitted that she never had heard it before coming into the hospital. She evidently possessed a good musical ear and sang this song remarkably correctly. On being asked how it was that she was able to sing it, never having heard the song, she tried to escape from the difficulty by pretending to have acquired the air through noticing the face and mouth of the singer ! This, I assured her, was impossible, at which she was evidently taken aback and began to weep. During the following day she was silent and moody, and in the evening she said to the curator : " I begin to hear a little in one ear." The curator, in order to encourage her, remarked that, as the deafness had taken three days to come

on, it might pass off in the same time. On the day following she said that her hearing was still better, and that the improvement was in both ears; on the third day she confessed that her hearing was perfect! On testing her now, she was found to hear the watch and whispered speech at the full normal distance in both ears. Our patient was now eager to go home, and she left the hospital after a residence of six weeks. Two months afterwards we were informed of the continuation of the normal hearing. On inquiry we were unable to trace any connection of the girl with deaf-mutes who might have been in the habit of practising lip-reading. She knew, however, the deaf and dumb alphabet from childhood, and for amusement had practised it with one of her brothers who was not deaf.

A SATISFACTORY TONGUE DEPRESSOR.

By CHEVALIER Q. JACKSON, M.D., PITTSBURG.

ON several occasions the writer has succeeded in getting a good view of the naso-pharynx in the rhinal mirror where others had failed—and he got it, not by superior skill, but by the use of a superior tongue depressor. The readers of the ARCHIVES may be interested in the following description of the instrument, abstracted from the *Medical Record* of May 7, 1892 :

“The general outline of this new instrument is seen in the cut. It is smoothly made of a single piece of steel,



nickel-plated ; it is light, simple, and readily sterilized by immersion in boiling water. It has a sufficiently narrow blade, not roughened, but deeply concaved beneath, thus holding the moist tongue by atmospheric pressure, that attaches it so tightly that the tongue may be drawn forward away from the posterior pharyngeal wall, thus to a great extent preventing retching. (In very sensitive fauces slightly warming is a further preventive.) The portion of the instrument com-

ing from the blade out over the teeth is thin and flat, and deviates to the right corner of the patient's mouth ; thence it curves downward, forming a long handle well curved up into a hook below, to prevent the patient's hand slipping. After the operator has placed a depressor in position, the patient can depress his own tongue better than the operator can do it for him. In this way the new instrument is superior to all others (about twenty different patterns) tried by the writer. In position, it is easily held by the patient, and lies very flat and out of the operator's way, giving the maximum of available working space. For posterior rhinoscopy it is very satisfactory, and it draws the tongue forward, thus enlarging the oro-pharyngeal space. For this the patient is directed to push slightly forward on the handle.

" The instrument is made in two sizes, the larger one for general use, the smaller for the small mouths of many women and most children."

NOTES FROM GREAT BRITAIN.

SOCIETY MEETINGS.

LONDON POST-GRADUATE COURSE.—The following lectures have been delivered in connection with this course at the London Throat Hospital, Great Portland Street: On May 5th and 26th, Mr. W. R. H. Stewart, on *The Examination of Ear Cases*, and *Causation in Ear Diseases*. On June 2d, Dr. Law, on *Perforation of the Tympanic Membrane*. On June 16th, Dr. Woakes, on *Vertigo*.

We have also received the prospectus of the arrangements for the winter session, commencing October 10th, from which it appears that the following lectures on otological subjects will be delivered, viz.:

At the Hospital for Sick Children, Great Ormond Street, on November 3d, Mr. W. Arbuthnot Lane, on *The Treatment of Chronic Purulent Otitis and its Complications*. At the London Throat Hospital, on October 13th, Mr. W. R. H. Stewart on, *The Examination of Ear Cases*. October 20th, Dr. Law, *The Examination of the Throat and Nose*. October 27th, G. Stoker, Esq., *Chronic Glandular Disease of the Nose and Naso-Pharynx*. On November 3d, Mr. C. G. Wilkin, on *Nasal Polyyps*. November 10th, Dr. Law, *Demonstration of Cases*. November 17th, Dr. Woakes, *Some Nasal Neuroses*. November 24th, Mr. Stewart, *The Causation of Diseases of the Ear*. December 1st, Mr. Stoker, *Impaired Movements of the Vocal Cords*.

THE ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION was held at Nottingham on July 26th to the 30th, and was in every way a great success. We regret to notice, however, that no special section was devoted to the subject of ear disease, but that both otology and rhinology were included in the laryngological section. Even if it is not considered advisable to have separate sections for these special departments of practice, the title of the

section in which they are discussed should at least be altered, so as to convey a correct impression as to the work to be done.

The laryngological section was opened on Wednesday July 27th by the president, Dr. R. A. Hayes. Among the distinguished visitors present were Professor Schroetter, of Vienna, and Professor Gruber. The subject of *Nasal Neuroses* was introduced by Drs. Stewart and Bronner, and the discussion was continued by Drs. Hovell, Lennox Browne, Scanes Spicer, Dundas Grant, Watson Cheyne, Robertson, Pegler, Barr, Semon, and MacIntyre. Professor Schroetter then made some observations upon *Neurotic Diseases of the Larynx*. Papers were read on *Rhinalgia*, by Dr. W. Hill, and on *Some Points in the Diagnosis and Treatment of Chronic Suppuration of the Antrum of Highmore*, by Dr. Scanes Spicer. Dr. Robertson discussed the *Treatment of Ozæna and Recurrent Nasal Polypi by Opening and Draining the Antrum of Highmore*.

On the following day, Thursday, July 28th, Dr. MacIntyre gave a demonstration illustrating the *Relationship of Bacteriology to Diseases of the Throat*. A paper on the *Importance of a Systematic Course of Physical Voice Training at Schools or Colleges, especially with Regard to its Influence on Prevalent Throat Troubles in Public Speakers and Others* was read by Dr. A. Sandford. On *Faults in Voice Production which Lead to Throat Disease*, by Dr. Lennox Browne. On *Throat Affections Peculiar to Voice Users*, by Dr. J. M. Hunt. On *A Frequent Cause of Irritation of the Throat in School Teachers*, by Dr. R. Ellis. Drs. Bennett and Barr made some remarks on the subject of *Voice Production*. In connection with Dr. Sandford's paper, resolutions were passed endorsing his views.

On Friday, July 29th, Dr. Bronner read a paper on the *Use of Trichlor-Acetic Acid in the Treatment of Ozæna*, upon which Dr. Lennox Browne made some remarks. Dr. Thomas Barr read a paper on the *Importance of Guarding against Injury to the Middle Ear when Treating the Nasal Passages and Naso-Pharynx*; Professor Gruber made some remarks. A discussion on the *Etiology and Treatment of Granular Pharyngitis* was opened by Mr. T. Mark Hovell and Mr. Lennox Browne, and continued by Drs. Donald, Stewart, Hunt, Ellis, Barr, Jacob, Warden, MacIntyre, Professor Gruber, and the president.

BRITISH MEDICAL ASSOCIATION, SOUTH-EASTERN BRANCH, EAST SUSSEX DISTRICT.—At a meeting held at East Grinstead

on May 25th, Mr. Verrall read a case of *Meningitis from Ear Disease, Followed by Recovery*.

APPOINTMENTS.

KELLY, A. B., B.Sc., M.B. C.M. Glasg., appointed surgeon for diseases of the throat, nose, and ear, to the Victoria Infirmary, Glasgow.

LAKE, RICHARD, F.R.C.S., appointed registrar and pathologist to the Hospital for Diseases of the Throat, Golden Square, W. London.

TURNER, N. H., L.R.C.P., M.R.C.S., appointed surgeon to the Royal Institution for Deaf and Dumb Children, Birmingham.

WARDEN, C., M.D. Aberd., F.R.C.S. Edin., M.R.C.S., appointed consulting surgeon to the Royal Institution for Deaf and Dumb Children, Birmingham.

WILSON, T. S., M.B. Edin., M.R.C.P. Lond., M.R.C.S., appointed consulting physician to the Royal Institution for Deaf and Dumb Children, Birmingham.

WINGRAVE, V. H. W., M.R.C.S.E., L.S.A., appointed assistant surgeon to the Central London Throat and Ear Hospital.

MISCELLANEOUS.

The annual meeting for the aural instruction of the deaf and dumb was held on July 13th. Complaint was made of the paucity of teachers under training at the training college, and there was a slight deficiency in the funds.

In a communication to the *British Medical Journal* of April 2d, Mr. Field gives his further experience in the use of pilocarpin. In this paper much stress is laid upon the importance of carefully selecting the cases suitable for the employment of the drug. It is pointed out that patients who hear better in a noise do not derive much benefit from pilocarpin, nor do those who hear better after a cold; on the other hand, patients in whom the skull vibrations are but imperfectly heard may be advantageously treated with this substance, as may some cases of marked aural vertigo, and to a lesser extent those who hear worse when tired, nervous, or out of sorts, and best of all those in whom there is any syphilitic history, congenital or acquired. Cases are adduced, in which, according to Mr. Field, the patients have not only improved at the time of taking the drug, but the improvement has been maintained for many months subsequently, and appears to be permanent.

HEMORRHAGE FOLLOWING TONSILLOTOMY.—The reading of Mr. Lane's paper on this subject, at a recent meeting of the Clinical Society of London, has given rise to a good many comments, and various suggestions have been made as to the best way of dealing with these critical cases. Mr. Lane's treatment of his own particular case is quite beyond criticism, for it is obvious that no one but himself was in a position to decide as to the urgency of the symptoms which called for such a severe operation as that of tying the common carotid. In the *British Medical Journal* for May 21st, Dr. Mark Hovell suggests that, in some instances at any rate, the inefficiency of the astringents employed in the first instance is in great measure due to their faulty application. He recommends that a paste of one part of gallic acid and three of tannic acid, with a little water, should be rubbed firmly into the bleeding surface with the surgeon's forefinger, counter-pressure being made from the outside with the other hand.

In the same journal, on June 4th, Mr. Bilton Pollard relates a case in which he succeeded in actually ligaturing the two bleeding points, and incidentally expresses the opinion that in many cases the digital enucleation of tonsils is both possible and to be preferred to their excision.

A case of *Aural Pyæmia*, successfully treated by removing a putrid thrombus from the jugular vein and lateral sinus, is reported from the Liverpool Royal Infirmary by Mr. Rushton Parker. The patient had had rigors for three days, with a temperature of 103° to 105° . Discharge of fætid pus from the left ear. Double optic neuritis more marked on the right side. The operation was performed on August 21, 1891, on the lines laid down by Mr. Arbuthnot Lane, and Mr. Ballance in 1888 and 1889. A plug of Horsley's antiseptic wax was used to check the bleeding from the sinus after the clot had been withdrawn, but this subsequently gave rise to symptoms of retention and had to be removed at another sitting. The patient left his bed sixteen days after the operation, and at the time of the report was doing quite well.

A lecture on *Aural Polypi*, delivered by Mr. Marmaduke Sheild to the students of Charing Cross Hospital, is published in the *Lancet* of May 28th. With regard to operative treatment, Mr. Sheild directs especial attention to the advantages of using a fine, slender, modified ring-forceps, with serrated teeth, like those of artery forceps, and a clamp-catch in the handle. A timely word of warning is also given as to the indiscriminate use of the plan of curetting out the tympanum.

INFLUENZA AND MIDDLE-EAR MISCHIEF.—To confirm the exception, which he had taken previously to a statement of Sir W. Dalby's, "that those with healthy ears have little to dread from influenza," Mr. J. Walker Downie, in the *Lancet* of May 28th, quotes two cases which he says are types of a series of acute middle-ear cases which have come under his notice, and in which the trouble has been distinctly traceable to an attack of influenza.

In the *Lancet* of June 4th, Mr. R. S. Miller emphasizes the importance of paying particular attention to removable causes of deafness that may sometimes be detected in deaf-mutes if they are carefully examined; and two very striking instances are adduced in which such attention resulted in a very satisfactory way—the patients, two little children of four years of age, being now on the way to having both speech and hearing restored.

Dr. Thomas Barr reports from the Glasgow Ear Hospital (*British Medical Journal*, July 2d) an interesting case in which he succeeded in removing an aural exostosis by means of the electric snare. The patient was a female aged twenty-four, and was admitted on account of severe aural pain and general symptoms pointing to the retention and absorption of septic material from the middle ear of the left side. A white, firm, rounded body was seen just inside the orifice of the meatus, attached apparently to the back wall of the canal at about the junction of the bone and cartilage. While firm it had not the ivory hardness of many of the exostoses found in this situation. The symptoms were such as to call for the removal of the tumor without delay, and the patient being anesthetized it was decided to first try the electric snare, which, with some little difficulty, was passed behind the growth, and on turning on the current and exercising slight traction the pedicle was severed. The pain and other symptoms quickly disappeared. On examination, the tumor was found to consist of hard dense bone with a thin layer of cartilage on the surface.

In his remarks upon the case, Dr. Barr draws attention : 1, to the frequency with which these growths have their origin in the posterior or mastoid wall of the canal ; 2, the rarity with which they are covered with cartilage ; 3, that the frequent entrance of water into the meatus is an important factor in their causation.

Cases of *Cerebellar Abscess* are not only extremely difficult to diagnose, but even when the seat of the collection of pus has been located with some degree of probability, the prognosis of these cases has hitherto been looked upon as almost hopeless. Mr. H.

P. Dean, in the *Lancet* of July 30th, makes a most valuable contribution to our knowledge of the subject by detailing a case in which he had operated successfully. In his preliminary observations, Mr. Dean alludes to the fact that, while operations for the relief of cerebral abscess are nowadays frequently performed, yet, in the event of pus not being discovered in the expected situation in the cerebrum, a good deal of hesitation is evinced in continuing the explorations into the cerebellum, or in subjecting the patient to the ordeal of a further operation, and he proceeds to show how it is perfectly possible to do this with comparatively little risk, and, if the proper site be selected for the trephine opening, only one skin incision is necessary to enable us to thoroughly explore the lateral sinus and the parts both above and below the tentorium.

The patient was a female aged fourteen who had left otitis media for five years, and symptoms of cerebral mischief for three weeks. At the first operation, on April 20th, the mastoid cells were freely exposed and chiselled away, and sufficient disease was found in them to justify the hope that all the symptoms could be thus accounted for. Contrary to expectation, however, little or no improvement ensued, and further operation was thought advisable; this was undertaken fourteen days after the first. After reflecting the soft parts, the pin of the trephine was applied one inch behind and half an inch above the centre of the opening of the external meatus. The dura-mater having been opened, the cerebrum was punctured with a trocar in half a dozen different directions, reaching so far inwards as to tap the ventricles, but no pus escaped. The trephine opening was then enlarged in a direction downwards and backwards, the lateral sinus exposed and explored, and finally the cerebellum was punctured, and in this last situation the seat of the collection of pus was tapped and upwards of an ounce escaped. The patient subsequently made a good recovery.

In the ARCHIVES OF OTOLGY, vol. xviii., Nos. 3 and 4 (September, 1889), p. 217, a somewhat similar case under the care, of Dr. W. Macewen is reported by Dr. Thomas Barr of Glasgow, and this, as far as we have been able to ascertain, is the only case previously published in which anything like success has attended the proceeding.

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